Evaluation in National Agricultural Research

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Evaluation in National Agricultural Research

Proceedings of a Workshop Held in Singapore, 7–9 July 1986

Editor: Douglas Daniels

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Abstract

Interest in the potential role of evaluation in improving the management of research is growing. The use of evaluation, however, is probably one of the weakest areas of managment at present. Although, there is a large body of literature on evaluation methodologies and the procedures for carrying out evaluation, little has been published on what evaluative information managers require and how this information can be most effectively gathered in a national research program. What resources should be devoted to ex ante assessment, monitoring, and ex post evaluations?

This workshop, held in Singapore on 7–9 July 1986, examined a number of case studies that document the present level of evaluation activities in different national programs and institutions. Participants used this case study material and their practical experience to reach consensus on some aspects relating to the different uses and users of evaluation, the role of evaluation in the planning process, and how to organize and implement an evaluation program in different types of research organizations. One session was devoted to reviewing the evaluation activities of external donor agencies. An alternative approach was suggested that would be more effective in the long run to both national programs and donor agencies. Areas of further collaboration between national programs related to training and impact studies were identified.

Résumé

On s'intéresse de plus en plus au rôle que pourrait jouer l'évaluation pour mieux gérer la recherche. Pourtant, l'évaluation est peut-être l'un des outils les plus négligés en gestion aujourd'hui. Bien qu'il existe une importante documentation sur les méthodes d'évaluation et sur les règles à suivre en la matière, peu d'auteurs ont abordé la question des besoins d'information des gestionnaires concernant l'évaluation, ni celle de savoir quel est le meilleur moyen de rassembler cette information au sein d'un programme de recherche national. Quelles ressources doivent être consacrées aux estimations, aux suivis et aux évaluations rétrospectives?

Un atelier, tenu à Singapour du 7 au 9 juillet 1986, s'est penché sur un certain nombre d'études de cas qui illustrent bien les activités d'évaluation qui ont cours dans les différents programmes et instituts nationaux. Les participants ont utilisé les informations rassemblées dans ces études de cas, y ajoutant leur propre expérience pratique, pour se mettre d'accord sur certains aspects tels que les différents objectifs de l'évaluation et ses divers usagers, le rôle de l'évaluation dans la planification, et la façon d'organiser et de mettre en place un programme d'évaluation dans divers types d'organismes de recherche. Étant donné que les agences subventionnaires étrangères sont à l'origine d'un grand nombre d'études d'évaluation, une session entière de l'atelier leur a été consacrée. On a suggéré une nouvelle approche, plus efficace à long terme, tant pour les programmes nationaux que pour les agences subventionnaires. On a aussi déterminé de nouveaux domaines de collaboration entre les programmes nationaux intéressés par la formation, d'une part, et les études d'impact, d'autre part.

Resumen

El interés en el papel potencial de la evaluación para mejorar la administración de la investigación, es creciente. Actualmente, sin embargo, el uso de la evaluación es una de las áreas más débiles de la administración. A pesar de que existe una literatura voluminosa sobre metodologías de evaluación y procedimientos para llevarla a cabo, poco se ha publicado sobre qué información evaluativa requieren los administradores o cuál es la manera más eficiente de recopilar esta información en un programa nacional de investigación. ¿Qué recursos deben dedicarse a las evaluaciones previas, a los controles y a las evaluaciones posteriores?

Este taller, celebrado en Singapur del 7 al 9 de julio de 1986, examinó una serie de estudios de caso que documentan el nivel actual de las actividades de evaluación en diferentes programas e instituciones nacionales. Los participantes aprovecharon este material de estudios de caso y sus experiencias prácticas para lograr consenso sobre algunos aspectos relacionados con los diferentes usos y usuarios de la evaluación, su papel en el proceso de planificación y la manera de organizar y ejecutar un programa de evaluación en diferentes tipos de organizaciones de investigación. En vista del alto número de evaluaciones que se comisionan, se dedicó una sesión a revisar las actividades evaluativas de los organismos donantes externos y se sugirió un enfoque alternativo que a la larga sería más efectivo tanto para los programas nacionales como para los organismos donantes. También se identificaron áreas para mayor colaboración entre los programas nacionales en relación con la capacitación y los estudios de impacto.

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Foreword

At a meeting in 1981, national agricultural research managers discussed resource allocation issues in agricultural research and identified evaluation as an important area requiring further study (*Resource Allocation to Agricultural Research: Proceedings of a Workshop Held in Singapore, 8–10 June 1981* [IDRC-182e]). They felt that evaluation could play an increasingly important role in helping managers improve the efficiency and effectiveness of agricultural research and contribute to building public support for national research programs. Several other issues recommended in 1981 for further work were addressed in subsequent years. It was not, however, until a meeting in 1984 of national agricultural research managers from the countries of the Association of South East Asian Nations (ASEAN) that a decision was taken to pursue the question of evaluation further.

Participants at the 1984 meeting suggested that many publications dealt with evaluation methodology but few showed how evaluation could be effectively incorporated into national research programs. Given the different organizational characteristics of national programs, it appeared unlikely that any one model or process could be developed for use in different countries. Assessing and drawing on the experience of different countries could be useful, however, in improving the effectiveness of evaluation in any particular country. Participants were unaware of any existing publication that provided such information.

The International Development Research Centre (IDRC) was asked to coordinate a subsequent meeting to provide a forum for national managers to present an analysis of the state of evaluation in their countries and to give representatives from agricultural research programs an opportunity to exchange views on their practical experiences. The meeting was held in Singapore on 7–9 July 1986 and was cosponsored by IDRC and the International Federation of Agricultural Research Systems for Development (IFARD), an informal association of research managers of which a number of the participants are members.

Because evaluation has value only if it provides useful information to potential users, it was decided to invite research managers, who are probably the most important users of such information, rather than specialists in evaluation methodology. It is also the managers who are responsible for determining what kind of evaluation process will be put in place, who will be responsible for carrying out evaluations, and what resources will be made available. As explained in the introduction to this volume, the meeting broadly focused on the kind of evaluative information needed by research systems and, hence, it addressed these questions of process, organization, and responsibility. The overall objective of the meeting was to review the existing state of the evaluation process in agricultural research systems and to consider how this process could be improved to provide better information for research management. Managers require information at each stage of a research program, and the meeting examined the kind of evaluative information needed: beginning with ex ante assessment of research, the monitoring and assessment of ongoing research, and the evaluation of completed research activities and the effects of research on development.

The workshop was divided into six sessions: reviews of agricultural research evaluation systems, uses and users of evaluations, evaluation in the planning process, organizing and implementing evaluations, role of external evaluations, and a review of follow-up work required. The discussions and conclusions of the meeting have been summarized and are presented at the beginning of this publication followed by the individual papers.

One reason for IDRC's interest in supporting this meeting was the opportunity it provided to learn about national activities and to ensure that the Centre's evaluation activities are compatible with and supportive of national program interests. Even though many donor agencies have a strong interest in evaluation, only three agencies were invited as observers to avoid diluting national program interaction at the meeting. Given the importance of donor evaluations in national programs, one external participant who has worked primarily with donor agencies was invited to present a paper on how evaluations by donor agencies could complement national needs.

The importance that managers attach to the issue of evaluation and its use was evident from the fact that all invited participants agreed to attend and prepare a paper. Because the purpose of this meeting was to provide an opportunity for participants to develop their own concepts about the most desirable types of evaluation systems, they were not given strict guidelines on what to cover in their papers. Thus, the papers vary considerably in their scope and emphasis. Although they are presented here under the heading of the session at which they were discussed, most papers cover a broad range of information and issues and are not restricted to the specific subject of the session.

The participants all agreed that evaluation can be an important information tool for management, although it is probably the weakest aspect of existing management systems. The workshop focused only on the role of evaluation in providing information for management and did not consider what other kinds of information are needed for planning or what the relative role of evaluation should be in overall information requirements. It was clear from the workshop that considerably more activity was taking place in national evaluations than had been assumed. Participants felt that further work and reviews are needed to refine these activities, and the donor agencies present indicated a willingness to support further follow-up activities. The most likely first action will be the initiation of a number of impact studies and several countries are already planning such studies.

Although each country must evolve an evaluation process that is compatible with its own national system, it is hoped that the papers and discussion summary included here will prove useful and stimulating to researchers and policymakers in other developing countries. The major benefit that was sought from the workshop was to provide for a pragmatic consideration of what is and what could be done; there was little discussion of ideal models. One consequence, given the subject matter and the approach that was taken, is that the proceedings may in some respects be judged to lack "rigour." If this is indeed the case, it is hoped that this will be compensated for by the material being original and providing stimulation to further work. Research management is becoming an increasingly complex field, and there are growing expectations and requirements for research to play a greater role in development. Evaluations can be valuable in allowing research managers to meet these expectations.

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Summary

Introduction

Agricultural research is the largest research sector in most developing countries and has grown rapidly in the last two decades. The quality of research has also improved significantly in many countries as the numbers of highly educated and experienced researchers has grown. Impressive results have been achieved in some areas as indicated by a growing number of studies that show high internal rates of return from investment in agricultural research. Although these studies suggest that there is still underinvestment in agricultural research, the political support needed to maintain and increase funding for research is often weak. Research managers must continue to find ways to increase such support by demonstrating the benefits from further investment in research.

Management of these increasingly complex research systems is an issue of growing importance that needs further refinement. Although agricultural research systems in some developing countries are nearly 100 years old, a systematic planning process is a more recent phenomenon and is still evolving in many countries. Research managers are conscious of the need to improve information to allow management decisions to be better informed. The growing complexity in terms of the size and number of research programs and the development of more systems-research activities makes it increasingly difficult for senior research managers to maintain a personal knowledge of all aspects of a national research system. The choices that research managers must make have also become more complex. They need more information on achievement of different development objectives than in colonial research systems, which were primarily directed to export crops and exotic livestock. Development objectives still require growth in export earnings but place more importance on meeting the needs of small-scale farmers. These farmers, however, often practice a complex system of intercropping in which the effects of new technology in any one area are not always obvious or well documented.

For all these reasons, research managers have been increasingly concerned that evaluation should provide them with more information to facilitate their management responsibilities. Information is needed at the stage of assessing and selecting research programs and projects, on the progress of ongoing research activities, and on the use and impact of research results. Evaluative information collected at one level is often needed for evaluation at another level, thus evlaution may be better thought of as a process than as a set of discrete ex ante, monitoring, or ex post activities. The same individuals or unit in a research organization may be responsible for assesssment at all these levels and, certainly, research managers have to be prepared to assess information from these different levels.

The meeting in Singapore, therefore, was structured to provide a broad overview of evaluative information needs and of how to incorporate evaluation most effectively into research organizations. Evaluation as a formal process is a fairly recent field of investigation, and much of the literature has been produced only in the last 20 years. The limited information available on the scope and nature of evaluation activities in their countries made it difficult for participants to provide a comprehensive picture. They varied considerably on the issues they chose to stress in their papers. The meeting, therefore, focused primarily on reviewing what features they thought were most essential rather than on the existing state of evaluation activities. The range of issues dealt with made it impossible to analyze many in depth, but the participants did achieve a remarkable degree of consensus on a number of key issues that are referred to in the following pages.

National Systems

The first session began with a review of the present state of agricultural research evaluation activities in two countries. This was followed by a discussion that brought out different features in other systems. As these studies often represented the first formal assessment of the existing situation in each country, participants used a variety of means — such as library searches, interviews, case studies, and questionnaires — to collect information. Given the complex, often diffuse, and undocumented nature of these evaluation activities, most participants had difficulty in developing a complete picture.

The participants represented a wide variety of institutional models such as regional research centres, national research coordinating councils, central planning agencies, national research organizations, and universities so that evaluation requirements in very different structures were reviewed. Some systems such as those in Colombia and the Indian Council of Agricultural Research (ICAR), with more than 6000 scientists, are highly complex and formalized whereas other countries, such as those in southern Africa, do not, as yet, have many formal procedures built into their systems.

Many of the papers assessed the extent to which the function of monitoring and evaluation was incorporated into the overall planning process; most authors felt that this function is inadequately integrated within the overall management system. Equally, most felt that the responsibility for evaluation was still widely dispersed and uncoordinated. Several institutions have established formal monitoring and evaluation units that are responsible for coordinating activities in this area; however, these probably exist only in a few countries. These units have, generally, been established only recently, often with strong encouragement from external donor agencies. It is expected that more research organizations will create such special units. The decentralized nature of research in countries such as Thailand makes it less likely that such a central unit could be established. The authors of the Thai paper indicated that any evolution of a more effective system would require a decentralized, cooperative process. University researchers tend to have a great degree of autonomy but, even here, the study by Appa Rao on Indian agricultural universities indicated that 5 of the 23 such universities in India have some type of evaluation unit established, although his paper indicates they perform few evaluations.

Evaluation procedures have changed in several ways recently. Several countries have introduced a more formal process of ex ante assessment of research projects, including the introduction of a logical framework analysis approach. Peru and the Philippines have introduced computer tracking of all research projects.

All authors pinpointed weaknesses in existing systems, such as coordination and duplication of evaluation activities, paper overload, and questions concerning the utilization of evaluations. These issues were explored in more depth during the subsequent sessions. Despite these weaknesses, the papers clearly indicated that more attention and resources are being devoted to the evaluation process in national research systems. The paper by Fonseca suggested, based on a literature search in several Latin American countries, that there was probably also a growing body of literature produced in developing countries relating to evaluation. This material is, however, often in the grey area and difficult to retrieve.

Uses and Users

The discussion of the elements that should be included in an effective evaluation process began with the session on the uses and users of evaluation. There was substantial agreement on both subjects during this session. All agreed that it was essential to determine the demand for information before creating a supply. Participants identified a large number of different users who could benefit from improved information. Although some of the uses of this information would be similar among users, no one type of evaluation could satisfy all potential users. It was pointed out that there is a hierarchy of expectations from research with changing expectations as one moves from the individual scientist up to senior policymakers.

Policymakers and a wider public need to be informed about the practical benefits from research. Central agencies such as ministries of planning or finance may have requirements for certain kinds of information, as the Thai study by Kamphol et al. points out. It was generally accepted that research managers at various levels are probably the most important users of information. They need to know if their priorities are right, if research is achieving its objectives, if human resources and physical facilities are adequate and appropriately utilized, and whether research results are being disseminated and used. Although research managers may be the most frequent users, it was suggested that the greatest benefit from evaluations could be to the individual scientists as evaluations can provide important and needed feedback and encourage the development of their own critical faculties.

Evaluation can also play an important role in increasing the credibility and satisfaction of scientists in building pride in their own and their institution's achievements. Several participants suggested that more attention should be given to parallel institutions such as extension and development agencies. This would allow them to appreciate better their complementary role in implementing new technological opportunities. Other actors or institutions outside the research system, such as extension services, may have unrealistically high expectations of the rate at which they can expect research results.

If evaluations are to be effective, it is important to define precisely what is wanted. This means careful preparation of the terms of reference of any evaluation. Several participants suggested that it is important to consult and involve as many users as possible in preparing the terms of reference and in the evaluations themselves. The process may be as important as the product. The paper by Parasram on the experience at the Caribbean Agricultural Research and Development Institute (CARDI) documents some useful benefits derived by the scientific staff as they became increasingly involved in evaluations.

Limitations

With so many potential uses and users, participants recognized that the resources that can be made available for any one user or in total are limited; possible benefits from increased information must be assessed critically. That any given level of resources should be fixed for evaluation was not suggested, although some participants indicated that they felt only modest resources should be used for ex post evaluations. Several papers provided, at least implicitly, some idea of the level of resources that can be used. The paper by Kyomo et al. pointed out that, in one small country, the evaluation of an externally funded project required about 30% of senior management's time. The Philippines paper by Librero et al. provided some estimates of the direct costs of reviewing 4000 research proposals each year.

Several participants pointed out the dangers of producing too much paper of little analytical content. The direct and indirect costs on staff time and staff resentment leading to what one paper described as the *harassment factor* can be very high. Scientists often react negatively to evaluative requirements because evaluation is misused for "inspection" or "auditing" purposes. Evaluation has often been perceived as focusing only on the negative and as a nonproductive interruption to research. These attitudes will not change until evaluation procedures are seen to contribute constructively to the research process. One important way to reduce staff resistance and reduce the costs of evaluation is to minimize both the number of evaluation activities and the range of issues addressed by any one review. In the case of ex post evaluations, this may mean better use of sampling techniques. In the case of ex ante assessment, adequate attention to data and conclusions already available in the published literature and files is critical. Often a review of existing information will enable issues that remain unresolved to be clearly distinguished from those that have been essentially settled.

Other limitations were also mentioned. Priorities in research are not unequivocally set even by the best ex ante analysis. Cultural factors, risk and serendipity, scientific capabilities, and political factors must also be taken into account. Monitoring reports can lack evaluative content and information is often not synthesized as it flows up through each level of management. Weaknesses in methodology and quality of analysis and poor dissemination and follow-up procedures limit the value of many ex post evaluations. These limitations require research managers to weigh carefully the costs of evaluation activities in relation to the benefits to be derived.

Evaluation in the Planning Process

Participants recognized that the evaluation function is just one component of an overall management system and that the role of evaluation must be determined in relation to this broader management process. Information from evaluations is needed at different stages of the research process and in differing degrees of detail as one moves from the scientist to the project leader, the institution director, and the head of the national agency. It was recognized that designing a process to give appropriate information at the right time to each level of management was a complex and challenging problem. Few countries would claim to have evolved a satisfactory approach. Differences in organizational structures, management styles, and lack of consensus about the level of information and planning required in a research system add further complications. A number of participants stressed that effective management of research does not necessarily require a highly formal and defined process. Good management can involve bringing people together and developing common goals. The quality of leadership may be more important than well-defined research procedures. The planning process can become too complex and ambitious in its requirements.

With this awareness, participants then reviewed the formal requirements for and the relative importance of evaluation at different stages of research from ex ante assessment through to ex post evaluation. They felt most confident about the role and value of ex ante assessment. The Philippines paper indicated the significant benefits that can be achieved at this stage from reducing duplication of research activities. Many countries felt they had a good system of ex ante assessment, although several country papers indicated that their project appraisal process was still extremely weak. Judging from the opinions expressed by the participants, the variation between different countries in terms of the quality and usefulness of evaluation was greater at the ex ante stage than at any other stage of the research process.

Participants recognized the value that monitoring information can have, although it was pointed out that monitoring reports often lack any analytical or evaluative content. The volume of information produced in a large research system from such reports can be overwhelming. Unless sufficient resources are devoted to synthesizing and acting on such information, much of its value is lost. The paper on ICAR by Acharya documented the limited time that committees now devote to examining monitoring reports.

Participants agreed that ex post evaluation can be most effective when the research objectives are carefully defined at the proposal stage. If performance criteria have been established, information on each criterion can be collected as the research is being undertaken. Some felt that the best time to decide on ex post evaluation was at the project development stage to ensure that objectives and performance criteria were clearly outlined. Several participants felt that, although it might be ideal to have such a clearly defined process, ex post evaluations can still provide useful information for managers, even in the absence of a formal planning system.

Level of Evaluation

Information is needed on scientific activity at different levels and participants discussed evaluation from the most specific level of the individual scientist through to the project, institutional, program, and national system levels. In addition to assessing research by level, there may need to be assessment of special issue or *stripe* evaluations that look at an area such as training or at dissemination activities throughout the research system.

It was suggested that evaluation requirements for each of these levels will vary in intensity, with the frequency of evaluations declining as one goes from the micro to macro level. One participant suggested that scientists' performance should be evaluated annually, but that program- and system-wide assessment should be undertaken less frequently, perhaps spaced as much as 5 years apart.

Present focus may be too strongly on project evaluation. Several participants pointed out the benefits derived from evaluation at the national research system level, even though these reviews may not always have been of the highest quality. Several of the institutions represented were established as a result of such system-wide reviews.

The need to evaluate the performance of individual scientists during project or program evaluations was one of the more controversial subjects raised during the meeting. Some participants pointed out that individual scientists will continue to resent evaluations if they can be used to criticize their performance or threaten their job. Clearly, however, many project evaluations, at least implicitly, reflect on the performance of individual scientists. It was suggested that project evaluations should not attempt to judge individual performance. Assessments of individual performance, which are needed to determine training, merit, or promotion, may need, however, to draw on project evaluations.

Impact Studies

Most discussion in this session focused on the importance of impact studies that would determine the effects of new technology on producers and consumers. Palma documents some of the studies that have sought to measure economic returns to research; and Kamphol et al. report the results of their study on three commodities in Thailand. Studies of economic returns may have a certain political value, although their reliability is questionable because they do not account for other factors that affect increases in productivity. They are, however, of limited value as a tool for resource allocation. They may measure the results of research programs that were effective 5–10 years before the study but that, at the time of study, have a very different emphasis or a weaker scientific capability because of staff turnover. Development and research priorities, such as a new emphasis on energy use, may have changed. The probability of future research breakthroughs may be considerably lower than those achieved during the period studied. Income distribution and nutritional or foreign exchange requirements may dictate directing more resources to areas that appear to offer a lower research payoff.

Despite these concerns about the value of economic returns to research studies, the participants placed a high priority on developing and using better measures of research impact. There was some discussion about the need for more micro-oriented studies that would measure the effects on individual producers and consumers of new technology and changes in income levels, employment, and other development objectives. Several countries indicated that they are either in the process of carrying out or intend to initiate such studies.

Organizing and Implementing Evaluations

Participants took one session to review some of the essential features that should be built into an effective evaluation system. Participants felt that the evaluation function must be clearly defined and specific responsibility assigned to some unit to carry out evaluations. It was difficult to generalize because research organizations vary so much in the degree of centralization of management. Some organizations are highly decentralized so that evaluation responsibilities could not be assigned to one central unit. Even in a centralized research system with a central unit responsible for evaluations, it was suggested that evaluations at the micro level should be carried out on a decentralized basis.

In centralized research organizations, most of the participants felt that there should be a specific monitoring and evaluation unit and that it should be positioned as closely as possible to the most senior management levels. Several participants felt, however, that more important than its location in a research system, was how much weight it carried vis-à-vis the ultimate decision-makers.

One issue that should be resolved by national programs is the mechanism by which evaluation findings are reviewed and explicitly accepted or rejected. Establishing a formal review committee composed of senior managers ensures that the results are at least formally addressed. One participant said that, in his experience, the authority vested in the evaluation review committees was the most critical factor; it could exercise as much influence as the senior executive officer of the research organization.

Participants also discussed the need to select appropriate methodologies and understand their limitations. They posed a number of questions, such as the kind of criteria that should be used for measurement, but they did not try to pursue these at this meeting. How scientific is existing evaluation methodology? Given that the meeting included research managers rather than specialists in evaluation, there was perhaps an unwarranted assumption that some of the weaknesses in evaluations were due more to the use of inadequate methodology rather than that weaknesses in the quality of existing evaluations were due to evaluators not using the best methodologies available. In reality, evaluation methodologies still have many limitations and these affect the quality and reliability of evaluations.

This led to a discussion of the need for more *training* in evaluation methodology and techniques for those specializing in evaluation. It was suggested that such training courses should develop skills at the broader level of strategic management of the evaluation function, focusing more on public administration issues than on methodological content. Communication skills should be one of the key components of such a course. The success of evaluations often depends heavily on the evaluator's ability to make other researchers feel comfortable with and interested participants in the evaluation. Communication skills developed in such a course should also deal with how to synthesize, disseminate, and encourage the utilization of evaluation findings because this is another common weakness.

In addition to specific training courses for evaluators, it was suggested that all scientists and research managers need to acquire a better understanding of the planning and evaluation functions in research. Training requirements would, however, vary according to responsibility. Time was insufficient to permit any detailed discussion of how such broadly based training could be developed; it was a subject that participants identified as requiring further work.

External Evaluations

External involvement in selecting or conducting evaluations can be significant and one session was devoted just to this issue. External input can take two forms: either evaluations commissioned by other agencies independent of the research institution or internal evaluations in which scientists unaffiliated with the institution are invited to take part.

This session first dealt briefly with the role of external participants in internal evaluations. Participants recognized that inviting outside specialists into ex post evaluations could be useful in adding additional expertise, objectivity, and independence to the process. Outside experts can also enhance the credibility of evaluation reports, both to the researchers in the organization and to interested nonresearch agencies. There can be some disadvantages, however, such as their lack of knowledge about the research system, which can generally be overcome by associating external evaluators with others more familiar with the system. Several participants pointed out that they are required by law to use external evaluators of programs at certain levels.

Participants then discussed the role of externally determined evaluations. Many national programs are subject to external evaluations commissioned by boards of governors, ministries, or central agencies. In addition, donor agencies that support research systems in developing countries have extensive evaluation programs, as documented in the paper by Berg.

The scale of donor-agency activities in evaluation is so large that participants focused on their role for the rest of the session. In some cases, donors are required by legislation to conduct evaluations. There can be practical benefits to the national program of the recipient country from such externally commissioned evaluations, such as the political support and credibility these reviews may provide. They can be useful in educating donor agencies about the constraints that exist in national programs and can provide grounds for providing additional external support. Given the limited resources of national programs, it was also suggested that such external reviews can be seen as a hidden asset in enhancing and complementing the information collected by national organizations. It was clear, however, that there are considerable irritations and disadvantages in the present situation.

The interests of external agencies can be different from those of national programs. They may be more short term than research managers think appropriate. Donor evaluations often focus on a particular project and do not account for the broader and longer term objectives of the program that the project is designed to support. Recommendations made to facilitate the progress of one specific activity may be incompatible with the overall program thrusts and infrastructural characteristics of the national organization. External agencies may not recognize the broader role in development played by research programs, such as those documented in the paper by Sadikin. One particular area where donor agencies often place more stress than national programs is on setting research priorities. National programs may place more emphasis, particularly in young and rapidly growing research organizations, on training and integrating young researchers into the organization.

Several cases were cited in which the number of independent evaluations commissioned by central and donor agencies absorbed a large proportion of management and research time, with research almost grinding to a halt and concomitant resentment. This resentment is particularly acute when the coverage of evaluations overlaps. Such duplication is not uncommon.

There was considerable consensus on an *alternate approach* that would be more beneficial to both national programs and external agencies. This approach would allow national programs to improve their own systems while strengthening their partnership with external development agencies. This discussion began with a recognition that *national organizations have the primary responsibility for program management including evaluation.* The primary objectives of external agencies are presumably to ensure that appropriate evaluations of activities that they support are carried out, rather than to carry out the evaluations themselves. It is in the interest of donor agencies concerned with strengthening national programs that the evaluative capacity of these national programs be strengthened as well. Participants felt that external agencies should promote this evaluative capacity, rely on it where possible, and strengthen it, both in terms of expertise and of finance, when required. Discussing and determining donor-agency evaluation requirements with national program leaders and building these into a continuing evaluation process would strengthen the collaborative relationship between national and external agencies. It would help to institutionalize and strengthen the national monitoring and evaluation systems allowing for longer term and broader benefits to the country and would promote a better understanding of the political and institutional elements of the country's development. Fortunately, the evaluation capabilities of many developing countries are growing and opportunities for donor agencies to rely more on national program evaluations are increasing.

Where external agencies still wish to carry out their own evaluations, participants agreed that there were several ways to make them more helpful and less disruptive to their programs. National programs would benefit from more interaction with the donor agency on the timing, objectives, and outcome of any externally commissioned evaluation. External agencies should be encouraged to identify their evaluation requirements as early as possible. Some participants suggested this could best be decided during the project definition stage. National programs should have some input into defining the terms of reference of such evaluations. They may be able to suggest additional questions of concern to them. Certainly, program managers should be familiar with the objectives of the review and have an opportunity to comment on the draft report before it is finalized. The evaluation may be considerably more accurate and insightful if the national managers can suggest team members, including possibly a member of their own staff. Closer consultation between national program managers and donor agencies would allow for better scheduling and reduce overlapping evaluations. Where different donor agencies are supporting the same program, they should be encouraged to commission joint evaluations or accept the evaluation findings of another agency.

There was some discussion about the benefits that could be achieved if donor agencies were to develop more coordination of their activities. It was suggested that better *donor coordination* could promote a more rational relationship with national programs. There was also some feeling, however, that a coordinated donor approach could work to the disadvantage of national programs; there was no consensus on this issue. Participants recognized that a more active involvement in all evaluations of their programs imposed certain requirements on them to improve their own capability and to devote more resources to this subject.

Conclusions

The final session started from a review of the previous sessions. Participants agreed that a substantial degree of consensus had been achieved on several issues, although many important aspects had not been adequately explored and required further analysis and discussion.

Participants were convinced that evaluation can be an important tool for improving research management, and concluded that further action was needed at the national program level to strengthen the contribution of evaluation. At present, it is one of the weakest areas in the management of research systems. As summarized by a working group led by Appa Rao and Yusof, the evaluation function "ranges from a superficial, cursory, and routine exercise to an elaborate and even cumbersome activity. Follow-up of evaluation findings is particularly weak. The concepts and scope are not clearly delineated."

Nevertheless, participants felt that the Singapore meeting had demonstrated that the use of evaluation was growing in national systems and that the level of activity in this area was greater than they had realized. Although each country has to evolve an evaluation process that fits its own conditions, further discussions and exchange of information between countries will identify a range of options from which individual countries can select. This will require further work to collect, analyze, and distribute the growing body of literature on evaluation in the Third World, which is not easily accessible.

Some of this further exchange of ideas and experience should involve professionals specializing in evaluation. It was suggested that the idea of creating an international association of professional evaluators should be considered to provide a continuing forum for exchange of information and ideas.

The participants felt, however, that research managers must also continue to be involved in these discussions. Many of the issues to be resolved relate to the role of evaluation in the management of research and to the structures and processes that must be established to enhance its contribution. There is a need to evolve a broader concept of evaluation within a public administration framework rather than to focus too narrowly on specific methodologies or on evaluation as an isolated or autonomous function.

The difficulty of continuing this dialog without an organized institutional base was recognized. Participants felt this meeting was particularly useful but that a more organized forum for future collaboration would be valuable. It was decided to pursue this subject at the global IFARD meeting of national research managers to be held in October 1986 in Brazil. One donor agency represented at the meeting expressed the willingness to provide support for further work on this subject; it is expected that several regional meetings will be held in the next few years.

Two specific areas requiring further collaborative action were discussed. One was the need to establish training courses that could be used to develop specific evaluation skills as well as to orient research managers and researchers toward more effective utilization of the evaluation function. Possible locations for such training courses were mentioned, but further investigation is needed on appropriate course content. External support should be identified before such a progam can be implemented on a regional basis.

The second area related to the need to use evaluations to develop public understanding and support for research. Many participants felt that there was an urgent need to assess the actual effects of research on producers and consumers. Although individual countries need to develop their own impact studies, participants agreed to exchange views on appropriate methodologies as well as to review the results and benefits from the completed studies. Several studies on economic returns to research in Latin America have already collected information on the micro effects of new technology on producers. It was suggested that this information must be analyzed and the results published. Several countries indicated that they were planning to carry out studies that would attempt to measure the effects of new agricultural technology on income, employment, and other variables at the family and village level. It is expected that support will be available to allow several countries to collaborate in the design and conduct of these studies.

In addition to further action on their part, participants also hoped that donor agencies would consider the more collaborative proposals outlined in the session on external evaluations. The monitoring and evaluation capabilities of national programs could be enormously strengthened if donor agencies were willing to support and use them. It was hoped that donor agencies would find an appropriate forum, such as in the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD), in which to review this proposal collectively.

Evaluation in Agricultural Research Systems

Evaluation of Agricultural Research in the Philippines

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Ex ante evaluation of research projects in the Philippines starts with the identification of priority research areas by national commodity research teams that are subsequently reviewed by the Technical Advisory Committee and later by the Governing Council of the Philippine Council for Agriculture and Resources Research and Development (PCARRD). During the initial years of PCARRD, detailed proposals were evaluated any time these were received by PCARRD. Evaluation was later linked with the national budget cycle. PCARRD then simplified the system by first requiring researchers to submit only capsule proposals during a certain period. The recommended proposals are packaged into a national research program and submitted to the Office of Budget and Management (OBM). Detailed proposals are then prepared by researchers for the technical evaluation of PCARRD.

Monitoring of research projects is done primarily through a series of coordinated reviews held in all regions whereby researchers present reports on the progress and results of research. Technologies for verification and dissemination are identified based on technical feasibility, economic viability, social acceptability, and environmental safety.

Ex post evaluation is conducted also through the annual coordinated review as well as through workshops. The performance of research institutions is evaluated based on their research program and impact and the development and utilization of manpower, financial resources, infrastructure, and equipment. In the same manner, the commodity assignment of institutions is also realigned.

The usefulness of the different evaluations and the results derived were viewed from three perspectives: researchers, research managers/administrators, and policymakers. For the researchers, the usefulness of evaluation findings comes from higher remuneration, recognition, opportunities for professional growth, better-quality research, and other fringe benefits. For the research managers, evaluation facilitates the identification of priority research areas and the decisions on research capability development helps in generating funds and streamlines research administration procedures. Finally, evaluation creates a better awareness among policymakers about the importance of a research environment conducive to the development, dissemination, and adoption of technology.

Efficiency in resource allocation and utilization has become critical for the Philippines. Questions on to whom, where, when, and how resources are to be allocated have become vital considerations in budget dialogs and allocation. The limited amount of funds available for a tremendous number of commodities, disciplines, and institutions makes resource allocation a complicated problem requiring a careful evaluation of research projects. Research evaluation has evolved from the simple, fragmented systems that existed before 1970 to the present more systematic, formal mechanisms that maximize the potential benefits from research and the chances of attaining these benefits through more effective program planning and monitoring.

This paper, based on an earlier report entitled "Research Evaluation Systems in Agriculture and Natural Resources," presents a review of the evaluation methodologies used in the national research system in the Philippines and the extent to which such evaluation has been utilized to improve research management. It represents a concerted effort to analyze, in retrospect, the types of evaluation followed, the factors that led to changes in the evaluation system, and the lessons and benefits derived from these experiences.

The first section traces the evolution of the national agricultural and natural resources research system and discusses the organizational structure, resources, and policies affecting research evaluation. The second section discusses the different evaluation systems in the country including ex ante evaluation, monitoring, and ex post evaluation of research projects and assessment of the usefulness of the findings of the evaluation. The last section provides a scenario for future evaluation strategies.

Philippine Agricultural and Natural Resources Research System

In 1971, a technical panel was created to survey and evaluate existing research programs and resources and to draw up policy recommendations for the improvement of agricultural research in the country. Results of the surveys identified six major problems confronting the agricultural research system: lack of central planning, lack of coordination, inadequate funding, inadequate facilities, a dearth of trained manpower, and ineffective dissemination of research results.

It is against this backdrop and on the strength of the recommendations of the technical panel that the Philippine Council for Agricultural Research (PCAR) was established in November 1972. Later, a mines research and development mandate was added to its functions and, thus, the name Philippine Council for Agriculture and Resources Research and Development (PCARRD).

PCARRD is entrusted with a number of tasks including

- To define the goals, purposes, and scope of research in agriculture, forestry, fisheries, and mining;
- Develop the national agriculture and resources research program based on a multidisciplinary, interagency, and systems approach;
- Establish a system of priorities for agriculture, forestry, fisheries, and mining research and provide mechanisms for updating these priorities;
- Program the allocation of all government revenues earmarked for agriculture and resources research; and
- Provide a mechanism for assessment of progress and updating the national agriculture and resources research program.

Establishment of the Research Network

Faced with numerous but ill-equipped and poorly managed research stations, which were under different jurisdictions, PCARRD felt that it was necessary to establish a mechanism to optimize the use of the research resources available no matter how limited these resources might be and provide for a development plan that would encourage these fragmented research institutions to pool their resources. A memorandum of agreement was drawn up between PCARRD and the Department of Agriculture and Natural Resources (now the Ministry of Agriculture and Food) and later between PCARRD and member institutions of the Agricultural Colleges Association of the Philippines (ACAP), which in effect made the resources and facilities of the different participating institutions available for research under PCARRD's coordination.

At present, there are 4 national multicommodity research centres, 8 national single-commodity research centres, 8 regional research centres, 81 cooperating stations, and 15 specialized agencies that make up the research network. These research centres are composed of stations of the Ministry of Agriculture and Food (MAF), Ministry of Natural Resources (MNR), universities and colleges, commodity institutes, and others.

In 1978, PCARRD instituted the consortium arrangement as a management strategy. Members of the consortium share their research resources, especially tractors, laboratories, and other facilities utilizing the resources of participating agencies in conducting research at the regional level. Eight consortia have been established since 1978.

Organizational Structure for Evaluation

PCARRD exercises two vital powers: the authority to review all research proposals in agriculture and natural resources, and the authority to recommend research proposals to the Office of Budget and Management (OBM) for funding. Figure 1 shows the basic organizational structure through which research projects undergo evaluation. It traces the general flow of the review and hierarchy of approval through which research proposals pass before implementation.

The Governing Council (GC) is the policymaking body of PCARRD. Chaired by the Minister of Science and Technology, the GC is composed of representatives from the MAF, MNR, National Food Authority (NFA), University of the Philippines at Los Baños (UPLB), PCARRD, and the private sector. Thus, the GC provides a stable link between national development and science and technology (S&T) goals. It ensures the continued relevance and responsiveness of the national research program to critical problems in agriculture and natural resources.

The Technical Advisory Committee (TAC) assists the PCARRD Executive Director in ensuring the quality and effectiveness of the national research program. By tapping the expertise from various research agencies, the TAC provides a multidisciplinary, multiagency outlook in research evaluation and implementation.

The Directors' Council (DC) is headed by the Executive Director who is assisted by two deputy executive directors (one for research and the other for financial management), seven technical research departments, and two service department directors (applied communication and financial administration). Multisectoral in nature, the DC provides a holistic and objective review of research priorities and projects. Although governed by the same objective in the development of a dynamic and responsive research and development (R&D) program for agriculture and natural resources, the GC, TAC, and DC perform at different levels and degrees of evaluation.

To assist PCARRD in formulating the commodity-based national R&D program, it has formed 36 national commodity research teams. Each team, composed of 8–12 scientists with specialization in different disciplines, defines priority areas and reviews

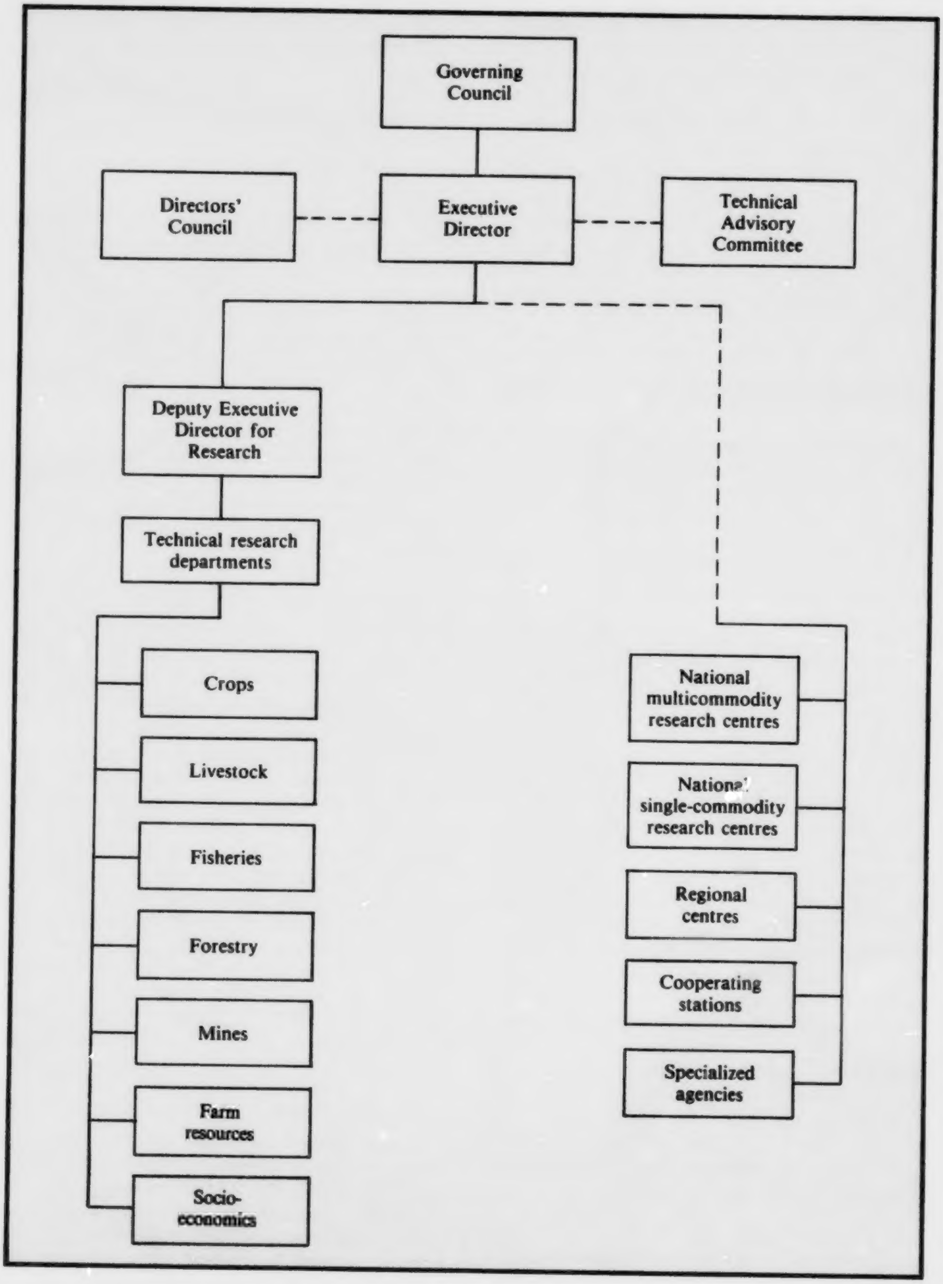
Governing Council
Directors' Council
Executive Director
Technical Advisory Committee
Deputy Executive Director for Research
Technical research departments
Crops
Livestock
Fisheries
Forestry
Mines
Farm resources
Socio-economics
National multicommodity research centres
National single-commodity research centres
Regional centres
Cooperating stations
Specialized agencies

Fig. 1. Basic organizational structure for research evaluation of the national research system for agriculture and natural resources in the Philippines.

and evaluates research projects for the commodity. The team leaders and members serve on an on-call basis enabling PCARRD to have access to the country's top scientists in agriculture and natural resources without draining the high-level manpower of research agencies.

To implement the national and regional research programs, PCARRD organized the existing agencies into the national network of research centres and stations as follows: national multicommodity centres, national single-commodity research centres, regional research centres, cooperating stations, and specialized agencies.[1]

Methods and Levels of Evaluation

The system of evaluating research projects in the Philippine national agricultural research system consists of ex ante, monitoring, and ex post evaluation. To some extent, institutional evaluation is also undertaken.

Ex Ante Evaluation of Research Projects

The National Research and Development Program (NRDP) serves as the basic guideline for all R&D activities in agriculture and natural resources. In general, the NRDP has four major components: national research goals, research thrusts of the commodities corresponding to the national goals, priority areas defining the research thrusts, and specific research projects in the identified research areas. The packaging of the NRDP, therefore, plays a vital role in determining how the country's scarce research resources will be allocated. It also represents the outcome of the ex ante evaluation of research proposals received by PCARRD for funding.

During the initial years of PCARRD, the detailed research proposals prepared by the researchers and endorsed by the agency head were evaluated when received by the respective technical research departments. A technical review panel headed by the commodity team leader was formed for each research proposal whose budget exceeded PHP 50 000 (20.5 Philippine pesos [PHP] = 1 United States dollar [USD]). Otherwise, the proposal was evaluated directly by the team leader and the department director. The major criteria used for evaluation are

- Adequacy, clarity, and attainability of objectives;
- Soundness of the methodology as it relates to the objectives;
- Workability of the task schedules based on the methodology and availability of funds;
- Reasonableness of fund estimates; and
- Capability and availability of proponents.

Comments are consolidated and sent to the proponent who revises the proposal and sends it back to the technical research department for further evaluation. The proposal then goes to the DC and later to the GC. Flaws in the evaluation system, primarily in terms of the time required for the PCARRD secretariat to process the lengthy research proposals, necessitated changes to improve the system. At present, PCARRD's program planning is very much linked with the national budget cycle as required by OBM. Within a 14-month cycle, proposals in capsule form are initially submitted and evaluated. The cycle involves primarily two phases that represent the major levels of ex ante evaluation: Phase A (program formulation) and Phase B (program implementation).

Phase A: Program Formulation

Starting in July 1981, researchers were no longer required to submit detailed proposals. A capsulized research proposal that outlines the major objectives, brief methodology, and budget is sufficient for the first evaluation.

A deadline is set (sometime in June of each year) for the submission of all research proposals, after which each of the commodity teams meets for the evaluation. During the evaluation each proposal is reviewed in terms of priority of the research area, importance of the study and its likely contribution with other ongoing and completed studies, and soundness of the methodology in attaining the stated objectives. The package of commodity research programs is then reviewed by the DC, then the TAC, and later by the GC. Once approved by the GC, the packaged Phase A program is discussed by PCARRD with all the concerned agencies during a budget meeting held for this purpose.

Phase B: Program Implementation

A more detailed review and evaluation of all the proposals included in Phase A is done upon receipt by PCARRD of the detailed proposals from the researchers. The technical evaluation is aimed at ensuring that projects are compatible with the broad national/regional development goals, priorities, and activities; justifying the allocation of resources for the project; ensuring that the methodology identified is adequate; and ensuring that the approved budget is in accordance with the schedule of activities.

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[1] "Commodity" is defined very broadly to include physical commodities like rice and pork, disciplines like applied rural sociology and macroeconomics, and resources like soils and minerals. Commodities under socioeconomics and farm resources and systems are considered macro commodities, whereas the others are micro commodities.

The evaluation is done either together or by a referral system. The Phase B budget recommendation is also discussed by PCARRD with all concerned agencies during a second budget discussion. During this discussion, results of the technical evaluation are considered when determining which of the "priority" activities will receive preferential funding. Funds are allocated first to ongoing projects that are technically sound and must be continued. Proposed projects are funded out of the agency's appropriations only when there are still funds available after all ongoing activities have been accounted for.

One of the most significant findings contained in the 1971 technical panel report is that most of the research projects implemented before the creation of PCARRD were not responsive to the national development goals. There was no effective mechanism for determining and updating national priorities for agriculture and natural resources.

The ex ante evaluation not only facilitates the identification and updating of research priorities but has contributed to a more efficient allocation of resources. For 1985, Table 1 shows the number of research proposals received by PCARRD by sector and the number of these proposals recommended for inclusion in the NRDP. The cost of evaluating these proposals by the commodity team amounts to PHP 33/proposal received or PHP 64/proposal recommended.

Out of the total number of proposals received in 1985, only 52% were recommended for inclusion in the NRDP (Table 1). The three most common reasons for rejection of proposals in Phase A (program formulation) are duplication, 44%; low priority, 37% and no technical merit, 8%. Except for forestry and farm resources, the proportion of rejected research proposals is higher than those recommended for all sectors. There is a very high probability, therefore, that some of the rejected proposals may have been the ones implemented if there was no ex ante evaluation made at PCARRD. As early as 1974, PCARRD saved the government about PHP 18.7 million in research funds through the suspension and termination of research projects that were of a low priority or duplicated other projects.

The major drawback in the Phase A evaluation lies in the limited information contained in the capsule proposals. After receipt and evaluation of detailed proposals in Phase B, therefore, a number of projects still do not get approved (Table 2). In 1985, for example, only 43% of those recommended under Phase A were finally included in the Phase B recommendation. The major reason for the decrease in the number of research proposals is primarily because of financial limitations rather than weaknesses in the evaluation scheme. In general, those that are not accommodated in the Phase B recommendation are reviewed again and are sometimes included in the following year's list. By and large, the Phase B evaluation is very helpful to researchers in terms of helping them to determine their objectives, establish the time frame, and identify the most appropriate methodology.

Monitoring of Ongoing Research Projects

In 1973, PCARRD conducted a national evaluation of all ongoing projects of universities and colleges, ministries of agriculture and natural resources, and other research agencies. After evaluating 1100 ongoing research projects, the number of studies was reduced to 658 (almost 40%). Some 364 studies with similar objectives and scope were integrated into 98 units producing more meaningful results, whereas 171 "ghost," dormant, and unimplemented projects were terminated. The original budget allocation of PHP 37.9 million was trimmed down to PHP 19.2 million effecting a "savings" of PHP 18.7 million of research funds in early 1974. Such savings were reprogramed and used for new priority research proposals.

At present, there are three mechanisms for monitoring the progress of ongoing projects: field evaluation, coordinated review and evaluation, and in-

Table 1. Comparison of the number of research proposals received and recommended or rejected by sector and an average cost of meeting per sector, 1985.

Sector	Number of proposals			Total cost of meeting (PHP)	Average cost (PHP)[a]	
	Received	Recommended	Rejected		Per proposal received	Per proposal recommended
Crops	1325	604 (46)[b]	721 (54)	49176	37	81
Forestry	451	327 (73)	124 (27)	26138	58	80
Farm resources	559	411 (74)	148 (26)	17408	31	42
Fisheries	639	276 (43)	363 (57)	13818	22	50
Livestock	371	175 (47)	196 (53)	20880	56	119
Socioeconomics	793	343 (43)	450 (57)	9212	12	27
Total	4138	2136 (52)	2002 (48)	136632	33	64

[a] 20.5 Philippine pesos (PHP) = 1 United States dollar (USD).

[b] Figures within parentheses are percentages.

Table 2. Number of studies included by sector in the 1985 Phase B (program implementation).

Sector	Recommended in Phase A	Included in Phase B	Number of research proposals		
			Approved[a]	Rejected	Deferred[b]
Crops	604	228 (38)[c]	78 (34)	10 (4)	140 (62)
Forestry	327	187 (57)	104 (55)	20 (11)	63 (34)
Farm resources	411	155 (38)	99 (64)	33 (21)	23 (15)
Fisheries	276	130 (47)	92 (71)	36 (28)	2 (1)
Livestock	175	60 (34)	34 (57)	6 (10)	20 (33)
Socioeconomics	343	149 (43)	114 (77)	5 (3)	30 (20)
Total	2136	909 (43)	521 (57)	110 (12)	278 (31)

[a] Recommended for approval by the technical research panel after technical review and revision of a detailed proposal.
[b] Due to unsubmitted or withdrawn research proposals.
[c] Figures within parentheses are percentages.

house review. These mechanisms, although they have their own specific objectives are basically aimed at

- Ensuring that progress and outputs are in accordance with plans;
- Determining if project resources are being used efficiently and are available at the right time in the required amounts;
- Promoting coordination among participating agencies by disseminating information on the scope, schedule, and problems of ongoing projects;
- Providing feedback necessary in project control involving the institution; and
- Providing feedback necessary in project planning and evaluation of ongoing projects.

Introduced in 1976, field evaluation consists of visits to the project sites on specific dates. These visits are generally timed with either the planting or harvesting season for most crop commodities. For nonseasonal commodities, however, the field visits are usually conducted in conjunction with the coordinated review.

The field evaluation has proven to be very effective in ensuring that researchers follow the schedule of activities and approved methodologies. Sometimes, written reports alone could not adequately cover the actual problems of field implementation. The field visits provide an opportunity for both the researchers and the evaluators to augment or emphasize certain issues with ocular proof.

The coordinated review and evaluation of ongoing and completed projects has become an integral part of PCARRD's regular monitoring activities. The coordinated review brings together and synchronizes the separate reviews and field visits that have characterized PCARRD's efforts to monitor research activities. Since 1981, there have been six coordinated annual reviews. The review for 1986, however, has been expanded further to include the review of technology verification activities of MAF.

Researchers, educators, research managers, policymakers, and representatives of the private sector participate in the reviews. About 60 government and private agencies participate during the review. Table 3 presents the breakdown of participants by year. On average, more than 1000 participants attended the reviews per year. In general, more than 8% were researchers, but a relatively reasonable evaluator/researcher ratio is maintained despite budgetary limitations.

Each researcher is allotted 10–15 minutes to report on the major highlights of his or her study after which an open forum discussion follows. In addition to the oral report, the researchers are required to submit a written report of the projects' accomplishments following a prescribed format. The major criteria used in evaluating the projects are attainment of the objectives, adherence to the approved methodology, adherence to the approved budget, and accomplishments and actions taken in response to the previous year's comments.

Table 4 shows the yearly costs of the coordinated review. On the average, the cost of evaluation per study is about PHP 210, which already accounts for all the incidental expenses including that of the researchers. This amount, therefore, can be considered minimal when viewed in terms of the benefits derived from the review:

- Facilitates the updating of information of ongoing research activities;
- Serves as a forum for the exchange of scientific information not only among researchers but also among research administrators, coordinators, extension workers, and the private sector;
- Facilitates exchange and retrieval of research information in the form of progress reports and terminal reports submitted and presented by the researcher. These reports are used in preparing the "Research Highlights from the PCARRD Network," which feature the technologies ready for verification and dissemination;
- Results are used as the basis for future agency programs and priorities; and
- It provides technical and personal skills training for the researchers.

Table 3. Distribution of participants in the coordinated review, 1981–85.

	1981	1982	1983	1984	1985	Average
Participating agencies	60	63	60	60	60	60
Evaluators and PCARRD staff	124	120	130	201	171	149
Researchers and research administrators and educators	871	814	1356	1049	1269	1072
Support staff	11	11	11	5	—	8
Total participants	1006	945	1497	1255	1440	1228
Evaluator/researcher ratio	1:7	1:7	1:10	1:5	1:7	1:7

Table 4. Annual expenditures for coordinated review and evaluation, 1981–85 (in PHP).[a]

	1981	1982	1983	1984	1985	Average
PCARRD						
Travel[b]	4126	66492	84866	83546	88315	65469
Food	104514	116854	168687	51565	75503	103425
Accommodation	5859	3979	5069	4426	4935	4854
Publication	59574	80000	80000	107696	101731	85800
Honoraria	—	—	—	13600	11400	12500
Supplies	7707	6907	12763	378	604	5672
Subtotal	181780	274232	351385	261211	282488	270219
Agency[c]	50300	47250	74850	209800	253800	127200
Total	232080	321482	426235	471011	536288	397419
Number of projects	1262	1009	1598	1586	1894	1470
Cost per project[d]	137	239	217	229	229	210

[a] 20.5 Philippine pesos (PHP) = 1 United States dollar (USD).

[b] Includes the amount allocated for the review plus expenses charged to the respective technical research department.

[c] Excluding supplies used in the reproduction of the reports for evaluation.

[d] Excluding publication costs.

In recent years, the research agencies began conducting their own in-house reviews recognizing the need to improve their research capabilities. As the term implies, the in-house review is primarily an internal activity, although some selected staff from PCARRD do participate. In 1985, 10 agencies conducted their own in-house reviews, which were also attended by PCARRD.

The in-house reviews give the agencies an opportunity to evaluate their research efforts. Also, a review enables them to focus the agency's activities on a common theme. In the case of the Philippine Tobacco Research and Training Center, the participation of the private sector, which plays a vital role in the development of the tobacco industry, facilitates not only the synchronization of all research, training, and extension efforts of all concerned agencies but the business side as well.

Ex Post Evaluation of Research Projects

PCARRD is also actively engaged in ex post evaluation of research projects. At the Annual Coordinated Review and Evaluation the completed projects are presented in addition to the ongoing studies. During the evaluation, the validity and reliability of the results of completed projects are assessed in terms of the methodology followed and level and type of analysis made. On certain occasions, significant results are presented in special workshops/symposia that allow wider participation and closer analysis of the results.

Basically, the same mechanisms and procedures used for evaluating ongoing projects are followed for completed projects. Specifically, however, the review of completed projects aims to identify generated technologies requiring further field testing and verification; identify mature technologies ready for packaging, dissemination, and utilization; and identify new research areas and significant findings for policy recommendations and development planning. The most significant benefits derived from the evaluation of completed projects are that it improves the reliability of research results as these are compared with previous results and methodologies and it facilitates the identification of follow-up studies that could make the results more meaningful and useful to target beneficiaries.

In instances where it is too late to correct faulty methodologies, the evaluators identify strategies and corrective measures to make the results useful and caution the researchers and readers on the limitations of the study and the interpretation of the results. As the monitoring efforts of PCARRD expand and become more efficient, however, this deficiency has been reduced significantly.

One of the most important uses of the evaluation of completed projects is that it facilitates the identification of technologies for verification and dissemination. The process, however, requires some level of evaluation of the technologies generated.

PCARRD's mandate goes beyond coordinating and providing direction to research efforts in the country. As a matter of policy, the research process must extend to the utilization and eventual application of the research output by farmers. The identification of the technologies ready for dissemination, therefore, is an important step in catalyzing this process. The criteria used in assessing whether the technology is ready for dissemination include technical feasibility, economic viability, social acceptability, and environmental safety.

Scientific investigations are normally conducted under optimal environmental conditions existing in research laboratories and experimental fields. Results of these experiments need to be validated under the physical conditions existing in different areas and under actual farm situations to hone up specific facets of the technology relative to the agroclimatic and socioeconomic needs of a particular area. In addition to providing measures to respond to location-specific problems, the verification process also helps the researcher to identify other areas to complement the technology and to determine if the technology is ready for wider application or adoption. The list of technologies can be used by agencies like MAF that undertake verification trials. It also assists PCARRD in identifying the priority research areas that can be pursued in the future.

PCARRD has also been actively involved in impact studies and those that assess the research capability of the country. The results of the assessment made by the 1971 Presidential Committee Executive panel were used as the basic justification and guideline for the establishment of PCARRD.

In 1973, PCARRD initiated a similar study to determine the total requirements to develop the country's research capability. Research capability was assessed in terms of manpower and physical resources available at the station. The study proved to be a logical step in assessing the development requisites of research centres and stations. The results of the study were used by PCARRD in estimating the cost of developing the research centres and stations and played a critical role in the initial negotiations for the Agricultural Research and Development Project I (ARDP I) research loan from the United States Agency for International Development (USAID). PCARRD also commissioned UPLB and the South East Asia Regional Centre for Graduate Study and Research in Agriculture (SEARCA) in 1974 to undertake the study entitled "Towards Developing an Effective Agricultural Research System in the Philippines."

Institutional Evaluation

As the national research system expands and research capability is strengthened, the need for higher levels of evaluation become more relevant. Although project review is still necessary, institutional and management needs do require that a total evaluation of research institutions is done to identify bottlenecks and to improve the system further.

To date, two types of institutional evaluation have been conducted. The first involved the evaluation of the performance and commodity assignments of agencies in the national research network. The second is a corporate review of PCARRD, particularly its agricultural research loans.

To optimize the use of limited research resources, PCARRD adopted a system where each agency is assigned specific commodities on which research activities should be concentrated. As it is, both human and financial resources for research are limited, thus agencies should direct research efforts toward important commodities or areas where they have the greatest expertise and capability.

PCARRD began its research station capability development program in June 1975. Since then, it has given the research centres substantial support in terms of infrastructure, equipment and manpower build up, and research grants and annual operational budget. The performance of these centres relative to the utilization of research facilities and manpower should be evaluated. In 1982, therefore, PCARRD created an interagency team composed of top-level management staff from six government agencies: MAF, MNR, National Economic and Development Authority (NEDA), National Science and Technology Authority (NSTA), UPLB, and PCARRD to assess the performance of the centres relative to the utilization of research facilities and manpower.

The criteria used to assess the performance of the centres are research program thrust and impact, management, manpower development and utilization, financial resources generation and utilization, infrastructure development and utilization, and equipment and supply utilization. The evaluation was conducted in situ from 10 October 1982 to 29 January 1983. Some of the recommendations of the team are

- There is a need for an in-depth review of commodity assignments;
- PCARRD and lead agencies should exert efforts to encourage research on the utilization of indigenous resources and technologies;
- Greater development efforts should be undertaken on rainfed areas, principally through farming systems approaches;
- PCARRD support for centre operation should provide for repair and maintenance of PCARRD-supported infrastructure and equipment for at least 2 years after which the centre should work out with OBM the necessary budget requirement for such purposes;
- The reasons why, after training, scholars fail to return to their agencies or complete their degrees should be reviewed; and
- Income generated from research projects should be used to support research and research-related activities.

One of the major recommendations of the team was the realignment of commodity assignment of the members of the research network. The list of agencies requesting to be a member or requesting for changes in the commodity assignments, or both, has also been increasing. Thus, PCARRD conducted a more in-depth review and evaluation of the commodity assignments.

Several teams were formed, and two consultation workshops were held to validate the results and recommendations of these teams. Finally, in May 1986, the recommendations on commodity realignment and agency application to the network were approved by the GC. Some 32 cooperating stations who have not been actively engaged in research activities during the last few years have been removed as members. The major criteria considered for commodity realignment and agency membership to the research network are manpower capability, research activity on assigned commodities, research facilities, importance of the commodity in the region, and present economic situation.

The PCARRD corporate review on the other hand was undertaken to assess the achievements of PCARRD since its establishment, assess the research management system and procedures it has developed and introduced, and provide recommendations in terms of new directions, strategies, organizational arrangements, and management procedures. The review team was composed of six expatriate members and two Filipinos who have been actively involved in research implementation and management in the country.

The team assessed the various programs and operations of PCARRD and how these contributed to the efficiency of the total research system. They identified several recommendations for the future direction of PCARRD:

- PCARRD should concentrate research in its national and regional network and should utilize the cooperating stations only when needed to evaluate locally the research conducted at the centres;
- PCARRD should develop strong national priority commodity programs through local problem identification and regional priority assessment, and then national organizations, evaluations, and recommendations;
- In negotiating and monitoring foreign-assisted projects, PCARRD should closely coordinate with OBM to ensure that local counterpart funds and loan proceeds are provided for in the annual budget appropriation;
- PCARRD should be the clearinghouse for funding all foreign-assisted agriculture and resources research programs. The linkage of PCARRD with implementing agencies on foreign-assisted project preparation, negotiation, implementation, monitoring, and evaluation should involve the scientists at the working level.

When the corporate review of PCARRD was done in October 1980, the same team was requested to make the ex post evaluation of ARDP.[2] The report of the team included an assessment of the status of loan-supported institutions in terms of infrastructure, acquisition, and utilization of facilities; implementation and management of research programs; quality of research supported under ARDP I; manpower training and management; and planning for future loans.

Less than 4 years after the first loan was approved, PCARRD negotiated with USAID for another loan to complement and boost the momentum in research capability development started by the first. In January 1984, PCARRD commissioned seven research and development experts to assess (a) the effectiveness of the ARDP II, (b) the overall performance of both ARDP I and II, and (c) the effectiveness of PCARRD as an instrument for national development.

Assessment of Evaluation Findings

Any evaluation can only be useful if the results are used to improve existing systems, identify new procedures that will increase the general efficiency and effectiveness of the system, and generate a positive response from concerned individuals and institutions.

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[2] The ARDP I involved a USD 5 million loan from USAID and PHP 113 million in counterpart funds from the Philippine government. The loan was used to provide research facilities, manpower development opportunities, and research funds.

To the extent that research evaluation reports are merely used to satisfy current needs and thrusts without necessarily contributing to the improvement of the system, then such evaluations can be considered less meaningful.

PCARRD has been actively engaged in various forms of evaluation from the research proposal stage to implementation as well as institutional evaluation. Considering the enormous amount of time, money, and facilities used in these evaluations, it is proper that an assessment is also made of the benefits derived from the evaluation.

The usefulness of the different evaluations and the results can be viewed from three general points of view: researchers, research managers/administrators, and policymakers. Although the discussions will focus on these three perspectives, the benefits derived by other sectors like extension workers, farmers, and the economy as a whole will also be presented to a limited extent.

Usefulness for the Researchers

Capable researchers are the single most important component of the research system. The technical panel that assessed research resources and formulated an overall research plan for the Philippines in 1971 identified several problems affecting the productivity of researchers. Among these problems were insufficient funding and facilities and inadequate training of researchers.

The study undertaken by UPLB and SEARCA in 1973–74 discussed in greater detail the factors affecting the productivity of researchers. The study revealed, for example, that research productivity increased slightly with training up to the MS level and increased dramatically with training beyond the MS level. Recognition by peers, users of research results, and the general public were also found to motivate researchers to engage in more research activities. Forms of recognition include promotion, citation, and assignment to more responsible positions. The usefulness of the evaluation findings to the researchers comes from higher/additional remuneration, recognition of research efforts, greater manpower development opportunities, better-quality research reports, and other fringe benefits.

The UPLB–SEARCA study pinpointed the consistently low salary of government researchers compared to their colleagues in the private sector. To remedy this situation, PCARRD negotiated with the OBM and the Commission on Audit to allow researchers to receive additional remuneration for undertaking research. Thus, in 1973, the GC approved the payment of honoraria to those undertaking research and to those involved in research planning and program/project development.

One of the main reasons for the movement of well-trained researchers out of active research is the relative attractiveness of administrative posts. To solve this problem, PCARRD, together with NSTA, established the scientific career system, which enables researchers to receive salaries as high as or even higher than research administrators. Also, a presidential decree, which offered civil service eligibility to scientific and technical researchers, was a major step toward making the scientific career system a reality.

In consonance with the researchers' view that citations are an acceptable form of recognition, PCARRD initiated the first "Pantas Award" in 1976. Conferred on individuals who have contributed to the advancement of agriculture and natural resources research in the country, the award has become one of the most prestigious means of recognizing researcher achievements. In 1985, PCARRD in collaboration with the Los Baños science community launched the "Most Outstanding Researcher Award." This citation, however, is limited to researchers within the Los Baños community.

Publication of one's research efforts is a recognition in itself. Over and above this, however, publications pave the way for other forms of recognition for the researchers. PCARRD has also been actively supporting the publication of scientific journals.

Research and institutional evaluation pointed out the need for adequately trained manpower; thus, PCARRD pursued a vigorous manpower development program by providing scholarships to enable researchers to take degree or nondegree programs in the country or abroad. This has motivated research agencies to establish their own manpower development programs, which has provided more advancement opportunities to researchers.

From 1973 to 1984, a total of 829 researchers have pursued degree programs through PCARRD scholarships. Of these, 79% undertook MS studies and 12% pursued doctoral studies. Recognizing the very insufficient manpower available for fisheries research, PCARRD also supported BA studies (9%) for fisheries. Both the ARDP I and the ARDP II have manpower development as a major component. ARDP I provided PHP 13.54 million and ARDP II, PHP 18.73 million for manpower development alone.

In addition to the degree programs, ARDP I and II provided for short-term, nondegree training programs here and abroad, observation and study tours, and the participation of Filipino scientists in symposia, workshops, and conferences outside the country. These gave Filipino scientists the opportunity to share their research findings with colleagues in the international community, visit research facilities abroad, and strengthen links with other scientists working in the same field. As of 1985, PCARRD has sent a total of 1636 researchers and research administrators from the network and the PCARRD secretariat on short-term training courses, conferences, and study tours within the Philippines, Asia, the Americas, and Europe.

Because of the strict proposal evaluation, the researchers must prepare a well-defined proposal that serves as a medium through which they can define clearly the objectives of the study, establish the time frame and strategy of action, etc. Through time, researchers become more skilled, reducing the time-consuming process of revision and reevaluation. Ultimately, this leads to better-quality analysis and research reports.

Other related benefits also form an important part of the package that private corporations use to attract potential employees. These types of benefits whether financial or otherwise are now also available to researchers.

Benefits for the Research Managers/ Administrators

The results of the evaluation have actually greatly facilitated decision-making by the research managers to ensure efficient research administration. In general, the benefits derived by the research managers/administrators from the evaluation facilitate the identification of priority research areas, facilitate decisions on research-capability development of the centre or station, help in generating research funds, streamline research-administration procedures, and provide recognition.

The problems of identifying what activities to pursue and where the centre should concentrate research efforts have become less difficult because the different reviews and evaluation actually specified the priority research activities for the country and for each region. As a result of the evaluation, the research managers become aware of the station's limitations and, thus, direct decisions on how these can be remedied. For example, the commodity realignment identified the specific commodities where the station can concentrate its research effort.

The various ex ante evaluations and the preparation of research programs have also pointed out the need for more research funds. Thus, PCARRD discussed with OBM the possibility of raising appropriations for research operations. A sizeable amount of grants in aid funds were, therefore, included in the yearly allocation from OBM. PCARRD tapped foreign sources as a way to augment research funds. As the links with foreign-funding institutions are strengthened, the research centres/stations are, thus, able to generate more research funds in close coordination with PCARRD. The advanced preparation of research programs has helped managers in examining projects more closely and allocating the limited funds to priority projects.

The various evaluations, however, criticized the bureaucratic red tape hampering research implementation. PCARRD, therefore, brought together 63 research administrators, budget officers, accountants, and auditors from various research-implementing agencies in January 1975. The participants discussed accounting, budgeting, and auditing mechanisms for research operations and formulated clear-cut recommendations that would allow efficient implementation of research projects.

The output of the workshop was put into action with the Commission on Audit issuance of a memorandum that prescribed new procedures in the procurement of supplies, materials, and equipment for research projects. In addition, the "Revised Auditing Manual for Research Operations" was launched in 1981. The manual incorporates budgeting, accounting, and auditing procedures that facilitate research-related financial transactions and expedite research operations.

The reviews and evaluations also led to the development of a specific format for research proposal preparation, evaluation, and implementation. The schedule for research proposal submission has been revised to fit with the budget cycle of OBM, thus reducing frustrations and delays.

The need for recognition extends beyond researchers. Research institutions are motivated to excel in research activities when their efforts are recognized. In 1974, PCARRD gave the first *Tanglaw* (guiding light) award, which has since been granted annually to institutions whose dedication has resulted in outstanding achievements in agriculture and natural resources research.

Usefulness for Policymakers

It is obvious from the foregoing that the different evaluations have been very beneficial to the researchers and research managers only to the extent that policymakers agreed and consequently made appropriate policies that complement or follow the recommendations of the evaluation. Without the evaluations, however, policymakers would not have had any basis on which to formulate their decisions.

The results of the technical panel review in 1971 helped in formatting a national research system and in the establishment of PCARRD. Without the review, policymakers would not have been fully conscious of the problems facing the research community. The review on the feasibility of granting a loan to finance the research-capability plan and subsequent approval by USAID of ARDP I enabled policymakers to recognize the role of research and, thus, provide funds to complement the loan. About 76% of the total budget of ARDP I was provided by the government.

PCARRD also recognizes the influence of policymakers and administrators in research development. These people, however, do not have much time to read lengthy technical reports, even if these have important implications on policies and programs.

In 1979, therefore, *Technology!*, a bimonthly publication containing brief information about a specific technological breakthrough, was prepared. The series is intended for easy reading and avoids unnecessary technical jargon and helps to make policymakers more aware of the significant contribution of research efforts.

The results of the different evaluations have been used to lobby for significant changes in the policies of the government relative to research operations. Some of the more significant decrees, executive orders, and policies include the establishment of PCARRD, 1972; addition of mines research, 1975; international support and cooperation, 1977; incentives for research personnel and administrative reforms, 1978; civil service eligibility for scientists, 1976; procedures in the procurement of supplies, materials and equipment for research, 1981; and establishment of the scientific career system, 1983.

Other Uses for Evaluation Findings

Ultimately, all research efforts and their evaluations are made to improve the welfare of the target beneficiaries — farmers, fishermen, and society as a whole. Although the evaluations are not directly relevant to the farmers, nevertheless, they ensure that research efforts are geared to the development and improvement of the farmers' welfare. As the research capability and productivity of the researchers are improved with the evaluation process, farmers also benefit through more labour-saving, low-cost technologies that enhance land and labour productivity. Similarly, as the research administration procedures are streamlined, the flow of technology from the research centres to the target beneficiaries is facilitated.

Extension workers are also provided with a greater number of technologies and information to assist them in their activities. Publications like *Philippines Recommends* and *Technoguide* are handy reference guides for extension workers as they assist farmers with their production problems.

The contribution of research to agricultural productivity has long been recognized. These productivity gains are due mainly to improved quality of the factors of production, more knowledge, and better infrastructure and institutional arrangements brought about by increased research efforts. Indirectly, therefore, the benefits derived by the society as a whole from the research investment are increased as the quality of the research efforts are improved through evaluation. Several studies have been conducted that assess the impact of research on agricultural productivity. In general, the findings indicate high rates of return to research investment. PCARRD is at present analyzing the returns to research investment in some commodities and in the entire agriculture and natural resources sector.

Table 5 presents a comparative status of the research system before 1970 and up to the present. This summarizes the significant changes that have occurred in the system and were instigated by the results of the different evaluations.

Recommendations

Future Action

In retrospect, one could indeed say that PCARRD had gone a long way in improving the national research system. It must, however, be continuously responsive to the changing needs and thrusts of a dynamic research environment. Given the mandate to introduce innovations and steer the research community toward development, PCARRD must be able to combine flexibility and structured objectives to be effective.

PCARRD developed systems of coordination and control that have served the research system during its early formative years. As the members of the research network gain more experience and maturity, however, PCARRD must also be able to provide them with greater opportunities and levels of participation in research planning and development consistent with their new capabilities.

The research system has progressed from the formative stage to greater maturity with more complex and varying needs. To help sustain these developments, PCARRD recognizes the following challenges and opportunities for future activities.

Keeping Researchers Active

To inspire the researchers' productivity and, more important, keep them in the system, PCARRD will have to work closely with the members of the research network to ensure an environment conducive to research creativity and dedicated work. Although PCARRD has succeeded in providing the necessary laboratories and equipment, these facilities must be continuously improved especially as new equipment and materials are developed. An improvement in research capability also implies that greater and more sophisticated levels of analysis will have to be conducted, but, without well-equipped laboratories and

Table 5. Comparative status of the Philippine agricultural research system, 1970–85.

Before 1970	1971–74	1975–80	1981–85
Research planning and programing · Inadequate and defective mechanism for planning and determining research priorities · Agricultural research priorities as numerous as the number of research agencies	· Inability to identify priorities in most agencies	· National and regional priorities already identified through the national commodity research teams and regional consultations	· The NEDA National Development Plan has been translated into specific research thrusts with the development of the PCARRD Corplan 1984–88 · Directional research already operational · Gap analysis synthesized status of all research undertaken and future research directions identified
Preparation of research proposals · Vague and loosely implemented procedures for the preparation, evaluation, and implementation of research projects	· By 1973 a handbook on "Guidelines for Preparation and Submission of Research Proposals" was published	· PCARRD guidelines and format already developed and widely used · Research agencies required to submit all research proposals during a specific period	· PCARRD guidelines already institutionalized and made a major requirement for research proposal evaluation · Format already revised for ease in computerization of information
Evaluation of proposals · Evaluation generally superficial only	· Complete absence or poor evaluation system in the research stations · PCAR's system of evaluation at the early stages of development	· PCARRD system of evaluation adopted, although slowly in some cases · Identified need to change monitoring and evaluation system from primarily a bookkeeping, quantitative procedure to one that will permit qualitative evaluation	· Evaluation mechanism fully operationalized even at different levels of project implementation · Variations in the evaluation system already identified to suit specific program needs
Implementation of research projects · Evident weaknesses in the implementation of research programs · Researchers work on problems independent of other efforts with similar objectives · Lack of central planning for research activities	· Lack of adequate supplies and facilities, which hampers efficient project implementation · Lack of awareness by researchers of the funds allocated for their specific research projects	· ARDP I was implemented with funding from USAID (USD 5 million) and counterpart funds from the Philippines government (USD 15 million) · The ARDP I provided funds for infrastructure construction, equipment acquisition, and manpower development	· The ARDP II complemented ARDP I with funds amounting to PHP 180.2 million · More multidisciplinary, multiagency programs are being implemented particularly as the 14 major programs identified in the Corplan are pursued vigorously
Data management · No systematic record keeping and disposal	· Still a problem in most centres	· The Management and Information and Control Services (MICS) computerized information for use in decision-making	· The MICS is fully operational and provides a link with the research centres
Dissemination of research results · Limited circulation of results with no systematic record keeping and disposal	· The Scientific Literature Service (SLS) was launched to provide researchers with information from an extensive collection of scientific literature	· The SLS initially included 30 research centres and stations but covered only Asian journals	· SLS now covers 98 libraries in the national research system and it has modernized library holdings through the computer-based Research Information Storage and Retrieval System (RETRES)

facilities, this may not be possible. PCARRD should also continue to develop and strengthen the critical mass of research personnel and provide greater opportunities for interaction with fellow researchers both here and abroad. The scientific career system should be pursued more vigorously to provide researchers with greater incentives to engage more actively in research.

Research Capability and Private-Sector Development

Two different evaluations pointed out strategies to strengthen the research capability of research centres. Although PCARRD has made considerable efforts in implementing these recommendations, foremost of which is the review and realignment of commodity assignments of research centres, they still present a major challenge for future activities. Effective research-capability development can be viewed as a complement to manpower and infrastructure/support services development. As the research system matures, this relationship will alter accordingly and PCARRD should be able to respond to these changes immediately if not anticipate them.

PCARRD has also always considered links with the private sector as an important component of R&D planning. Private-sector representatives, therefore, sit in as members of the GC, TAC, and the national commodity teams. There is still room, however, for greater cooperation.

Improvement of the Program-Planning and Budget Process

Although there have been significant improvements in the program-planning and administrative procedures, this area still presents a major challenge to PCARRD and the research system. The planning cycle can still be shortened if administrative and technical procedures are coordinated. As the research centres gain maturity and become more capable, the need to review the detailed research proposals will be less pressing. This poses a challenge to the centre and the researchers to develop feasible research proposals without direct, rigorous evaluation by PCARRD.

PCARRD should, therefore, continue to communicate with OBM and other concerned agencies regarding the procedures and requirements for research implementation to identify areas where improvements could be made. Regional planning capabilities should also be strengthened, i.e., regional research centres should be able to develop and identify not only regional needs but also to harmonize these with national research efforts.

Extensive, Effective Technology Dissemination

The research utilization efforts will focus on

- Realizing that access to information entails costs for the farmer, PCARRD should expand its efforts in producing publications addressed to the development workers who will bring this information to them. Low-cost publications for the farmers and rural broadcasters should also be produced.
- The action programs and technology verification trials should attempt to increase farmers' involvement to enable them to judge for themselves the merits of a new technology, thereby lessening the risk and uncertainty inherent in the adoption of a new technology.
- Political support should also be maximized through the distribution of more policy-oriented publications and the involvement of policymakers in workshops and symposia where significant results are presented.

Efficient Information Management and Retrieval

Much research information has already been generated in the last few years. The usefulness of this information, however, is limited unless it is available to the researchers, policymakers, and extension workers. PCARRD has initiated significant improvements in data management, particularly with the development of computer facilities for data processing and retrieval. The system, however, is far from being fully utilized. Within the secretariat, valuable data and information are kept on files that are not properly identified or classified. PCARRD should, therefore, strengthen its capacity to serve as a repository of research information. The proposed data-banking system is a step in this direction.

Complementing Research and Development Efforts

National development realities dictate that PCARRD and its constituents focus on the development mandate. In response, PCARRD has intensified its pilot-testing activities. The dissemination of these technologies can be further facilitated through PCARRD's pilot programs and action-research activities. On the one hand, basic and applied research efforts generate the technologies for verification and dissemination, but the development efforts, on the other hand, should be able to provide the feedback necessary to make the research activities more relevant to development needs and bridge the gap between potential and actual yield levels.

Regionalization Process

PCARRD was among the first agencies to advocate the regionalization process. It has conducted, in collaboration with other agencies, a series of regional conferences in an attempt to assess accurately the research and agricultural information needs of the region. The annual coordinated review and evaluation of ongoing and completed studies has continuously shifted the planning and coordinating activities to the regional centres.

PCARRD has long recognized that greater responsibilities in managing R&D efforts should be granted to the research centres. PCARRD, however, will continue to provide assistance and will be involved in decision-making to ensure that national development needs are met and that the required links with other centres are provided.

Evaluation of Agricultural Research in Southern Africa

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The countries of the Southern African Development Coordination Conference (SADCC) include Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. The major goals of the union are to become economically self-reliant to reduce external dependence, especially on the Republic of South Africa. In agriculture, the goal is to raise productivity and improve the nutritional status of the population; reduce imports, especially of basic grains; increase exports; raise the incomes of farmers; and create employment, particularly in the rural areas. Agriculture is important because it contributes 34% to the gross domestic product (GDP), employs 79% of the total labour force, and accounts for 26% of the total foreign currency earnings. The annual growth rate, however, is only 2% compared to a 3.4% human population growth rate. Because agricultural research contributes substantially to increased agricultural productivity, SADCC has set up a unit to coordinate this agricultural research activity. The unit contacted the national agricultural research systems (NARS) about the status of research evaluation, and this paper presents the findings of the investigation.

In all the NARSs, formal and informal ex ante, monitoring, and ex post evaluations were being done. Ex ante and ex post evaluations were more common in externally funded research projects than in nationally funded ones. The Directors of Research (DAR) preferred that evaluation be done on an annual basis. There were no specialized units to undertake evaluation. DARs, Chief Research Officers (CRO), and Directors of Stations (DS) conducted evaluations. External reviewers, peer reviewers, and outside consultants plus a few local scientists conducted evaluations of externally funded projects. One country was going to establish a separate unit for evaluation.

Projects were more frequently evaluated than programs and institutions. Recently, in one country, however, two institutions had their programs and institutions evaluated. The methodologies employed included interviews, questionnaires, and written reports. The DARs observed that, although a combination of methods was preferable at present, interviews were more commonly used than other methods. A separate budget was not usually set aside for evaluation except in one country. The DARs did not want to have a separate budget for evaluation. The DARs admitted, however, that evaluations were very useful as they assist in guiding the direction of research, revising recruitment needs for agricultural research, gauging training needs for agricultural research, guiding in financial resource and support staff allocation, and streamlining and managing agricultural research.

The Southern African Development Coordination Conference (SADCC) was formally established in April 1980 at a summit held in Lusaka, Zambia. The Heads of State of the nine independent nations comprising SADCC (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe) adopted the Lusaka Declaration entitled "Southern Africa: Towards Economic Liberation," with the following four objectives:

(a) The reduction of economic dependence, particularly, but not only, on the Republic of South Africa;

(b) The forging of links to create a genuine and equitable regional integration;

(c) The mobilization of resources to promote the implementation of national, interstate, and regional policies; and

(d) Concerted action to secure international cooperation within the framework of our strategy for economic liberation.

The activities of SADCC are enshrined in a "Program of Action" document drawn up and adopted at the Lusaka Summit in April 1980 that gives responsibility for coordination in the various sectors of regional cooperation to individual member states; for example, Botswana is responsible for coordinating regional efforts in agricultural research. Agriculture is the backbone of the economy of every SADCC member state. It contributes about 34% of the region's gross domestic product (GDP). At the same time, it absorbs about 79% of the total labour force and accounts for some 26% of the total foreign currency earnings. At present, food production is largely in the hands of the smallholders, whose traditional methods of cultivation have not yet been adopted to utilize improved farming methods and external inputs.

In most SADCC countries, yields of food crops have been either increasing slowly, are stagnant, static, or are declining. On average, food production in the region has been growing at an annual rate of 2%, whereas the human population has shown an increase of 3.4% per year. In other words, the per capita food production in the region has been declining at an annual rate of 1.4%. The member countries that have shown increased crop production have done so mainly because they have expanded the area under cultivation rather than increased output per unit area. Production of food and cash crops came under particular threat from 1978 to 1983 because of the continued drought in most of the SADCC countries. The net results of continued low food and cash crop productivity have been increased malnutrition, lowered income earnings, and contribution to an ever increasing rate of unemployment. The latter has resulted in increased migration from rural to urban areas. All these factors, in most cases, put considerable pressure on the limited national budgets in attempting to provide adequate infrastructure and such public utilities as housing, food, water, and roads.

Several studies have documented how the agriculture sector could become more productive if improved techniques and new technologies were developed and used in agricultural production. The well documented, worldwide high pay off from agricultural research influenced SADCC member states to establish the Southern African Centre for Cooperation in Agricultural Research (SACCAR) in 1983 with the following mandate:

(a) Maintenance of up-to-date information on the agricultural research resources in the SADCC region;

(b) Promotion of research publications in the region;

(c) Convening of workshops, seminars, and meetings on topics of regional concern;

(d) Promotion of training both within and outside regional research programs in consultation with the manpower sector coordinating member state;

(e) Promotion of the use of research agencies outside the SADCC countries; and

(f) Coordination of the work of donors in support of agricultural research and technology generation within the region.

SACCAR, however, will not engage in research per se except research that relates directly to the foregoing objectives. SACCAR, located in Gaborone, Botswana, is at present apart from the SADCC countries and is supported by various countries and agencies including several international agricultural research centres.

Historically, all nine SADCC countries were under colonial domination before the 1970s and, in some cases, the 1980s. During this period, research was directed toward cash/export crops for the benefit of the ruling countries. Looking back objectively, it is apparent that the agricultural research efforts of former years paid some dividends to these countries.

But increased production of commercial crops in those years largely benefited only a small fraction of the farming communities, mainly European settlers. The situation since independence in most of these countries has changed substantially. The priorities of all the SADCC countries are in favour of food self-sufficiency first and export of cash crops second. This change in priorities is mainly based on the fact that more than 75% of the population lives in rural areas and there is a need to improve their nutrition, incomes, and their overall welfare. What this amounts to is that the research efforts must produce results that benefit the majority of their human populations. In some cases, steps have already been taken to guide research in this direction.

The recognition by each of the SADCC member states that research can lead to increased agricultural productivity and, therefore, reduce malnutrition, increase incomes, and improve the welfare of its citizens, led to the setting up of national agricultural research systems (NARS). The output, however, from the NARS has to date not been as high as expected. Some of the reasons for this inadequacy may be attributed to the following.

(a) A lack of clear focus in research to address national goals: There are about 30 government (publicly funded) research institutions with about 1000 professional staff members in the SADCC countries. In addition to these are 18 privately funded research establishments and these deal mainly with commercial or export crops. The orientation of the individual research projects in many cases aims to assist the large-scale farmer. The problems that are not of high priority to the smallholder/peasant farmer are not normally addressed. It is fair to mention that the NARS are changing their foci and research is being aimed at solving the problems the smallholder farmer is facing. The extension service is also struggling to find ways and means of assisting the smallholder farmer.

(b) A lack of a critical mass of trained manpower to conduct agricultural research: Each of the SADCC member states has a polytechnic, certificate and diploma agricultural training institutes and colleges to train middle-level technical manpower, and a national university to train professional staff. A common characteristic of these universities is the fact that they have more arts than science students and that in most of them the training of scientists in agriculture started in the 1970s. Training at this level has in fact not been initiated in some countries. The 1984 Agricultural Research Resources Assessment (ARRA) study showed that 25% of the professional staff in research, extension, and training systems in SADCC were expatriates. The majority of national research staff have less than 10 years of working experience and are holders of a BSc (Agric.) only.

(c) Low allocation of resources to agricultural research: Although there is a disparity in investment in agricultural research as a percentage of the GDP from 0.26 to 0.42% between SADCC member states, these figures are considered low if agricultural research has to produce technologies that will enable smallholder farmers to produce substantial surpluses. The Organization of African Unity (OAU) in its recent declaration on development up to the year 2000 has urged its member states to raise investment in agricultural research to 1% of GDP and support for the agriculture sector in general to 24% of the total individual government's annual budget. In the ARRA study, agricultural research scientists attributed lack of laboratory and farm equipment, books and journals, and transport and experimental materials to low budget allocations by the national governments. Private-sector investment in agricultural research is low and concentrates mainly on cash crops grown by commercial farmers. Although donors are supporting agricultural research at the national level in the SADCC region, there is concern that depending solely or to a large extent on this source and depending too little on local efforts leads to disastrous consequences when external funding comes to an end.

(d) Output of irrelevant research results: Year after year, institutions and organizations are actively involved in agricultural research, the results of which are written up and documented in annual reports. These are in most cases excellent sources of empirical research findings but are unable to generate new knowledge or information that could be applied in solving problems under farmers' conditions, especially at the subsistance farmers' level. It is essential, therefore, in the present era of scarce financial manpower and infrastructural resources, to review periodically the whole agricultural research process, including planning, execution, and impact. It is becoming increasingly apparent that agricultural research monitoring and evaluation (M&E) must be an integral part of the research itself.

(e) A lack of links between agricultural research and other national efforts in agricultural development: The ARRA study has shown that research, extension, and training staff and their administrative units are not sharing their skills and experience in planning and implementing their programs for increasing agricultural productivity. Links between crops and livestock professionals and technical staff in most countries are nonexistant. Linkages are similarly lacking between research, extension, and training in the ministries of agriculture on the one hand and the national university on the other. This lack and the resulting difficulty in communication is further complicated by the fact that the universities are administered by the ministries of education. The result of these inadequate or nonexistant linkages is underutilization of existing professional skills and the lack of a concerted effort to address issues affecting smallholder farmers. To improve the productivity of crops and livestock, therefore, a continued research effort is necessary if agricultural productivity is to keep pace with the domestic and export requirements of SADCC member states.

Agricultural Research Planning and Funding in SADCC

Agricultural research priorities in the SADCC countries appear to be broadly dictated by the general agricultural policy of the country and, to a great extent, by the availability of funds for research. Throughout the region, the current emphasis on food self-sufficiency has had a marked influence on priorities in agricultural research as is evident in the case of Botswana, Zambia, Zimbabwe, and Tanzania.

Mechanisms to establish research priorities vary from country to country. In Swaziland, for example, priorities are determined at the annual meeting for program planning, which is chaired by the Chief Research Officer. The meeting brings together scientists, policymakers, and planners from the Ministry of Agriculture, the university, and the extension service staff. In Botswana, meetings of the Animal Production Research Committee and the Arable Crops Research Committee identify and define research priorities. Similar systems operate in Tanzania, Zambia, Lesotho, and Zimbabwe. Research carried out at universities in the region has to a considerable degree been determined by (a) the interests of the scientists concerned; (b) the availability of funds and facilities; (c) interaction between the universities, ministries of agriculture, and other research institutions; and (d) the availability of infrastructure and facilities.

Most research leaders at universities in SADCC countries (Tanzania, Zambia, Zimbabwe, and Swaziland) are senior scientists already well acquainted with the prevailing research priorities in their respective countries. The research orientation of several universities in the SADCC include

(a) Tanzania (Sokoine University of Agriculture) intercropping project, pulses and groundnut project, agroforestry studies, sorghum utilization project, grain storage project, and bean improvement project;

(b) Zimbabwe (University of Zimbabwe) farming systems studies and groundnut pathology;

(c) Zambia (University of Zambia) wheat project and livestock feed studies; and

(d) Swaziland (University of Swaziland) intercropping studies.

In all the SADCC countries included in this study, the planning of the agricultural research activities and projects was achieved by a bottom-up approach (Table 1). The steps outlined in Table 1 are applicable to the research institutions within the ministries of agriculture in these countries. Funding of agricultural research projects and programs in SADCC countries comes mainly from government and donor agencies. Although figures for total funding were not immediately available at the time of preparing the report, respondents in most countries contacted indicated that support for research came mainly from external donor agencies, exceptions being Zimbabwe and Tanzania. The observed pattern of funding of agricultural research was still in agreement with the previous study made in the region in 1984. Agricultural research in Mozambique, for example, received 70% of its support from external donors in 1983. Comparable proportions were also received by Lesotho (82%) and Zambia (about 70%). In Swaziland, Zimbabwe, and Tanzania small amounts of research funds are obtained from private organizations. Such funds go into supporting commodity research of commercial interest.

Table 1. Steps involved in agriculture research project/program planning in different SADCC countries.

Stage I	Stage II	Stage III	Stage IV
Botswana			
• Outline of research by scientists	• Proposed workplan discussed and approved within section	• Workplans discussed and recommended by the Arable Researchers Committee or Animal Production Researchers Committee	• Action by the director of research
Lesotho			
• Quarterly workplans proposal prepared by scientists on the basis of available information	• Quarterly workplans discussed and recommended within the section	• Quarterly workplans discussed and recommended at a meeting chaired by the director of research	• Action by the director of research and specialist services
Mozambique			
• Scientists of the institute prepare research proposals	• Proposals are discussed by the Technical Consultative Group and recommended		• Action by the director of the institute and transmitted to the ministry
Swaziland (FSR)			
• Baseline survey made (farming systems research)	• Each scientist prepares a workplan	• Proposals are discussed at a program planning meeting chaired by the chief research officer	
Tanzania			
• Workplans prepared by scientists within commodity discipline	• Coordinator compiles workplans from various disciplines and reviews and prepares presentations	• Proposed workplans discussed at the coordinating committee meetings and recommended	• Recommended workplans from coordinating committees are actioned by the director of either the Tanzania Agricultural Research Organization (TARO) or the Tanzania Livestock Research Organization (TALIRO)
Zambia[a]			
• Workplans prepared by scientists within commodity disciplines	• Workplans compiled and discussed at the commodity level and recommendations made	• Workplans discussed and recommendations made in an annual research review	• Action by the chief research officer
Zimbabwe			
• Workplans prepared by scientists based on data from previous work information from commercial or communal farmers	• Workplans are discussed at the section level and the head of the section makes recommendations to the head of the institute	• Workplans are reviewed at the institute level and recommended to the deputy director	• Workplans are discussed in planning meetings at the institute — action by the deputy director

[a] The workplan is to be adopted soon.

Research Evaluation

In all of the SADCC countries studied, there was no established unit responsible for evaluating agricultural research. In most countries, responsibility for agricultural research evaluation lies within the Directorate of Agricultural Research. In Lesotho, the office of the director of research and specialist services was responsible for the review and evaluation of the agricultural research program through the director of research. A similar system operates in Botswana and Tanzania. In Zambia and Swaziland, this responsibility rests with the respective chief research officer.

The responsibilities of directors of research and chief research officers outlined could be considered to amount to an internal review and evaluation system. While executing these internal evaluation functions, the offices identified are also assisted by various standing committees in the respective countries, the majority of which meet annually. Universities and research institutes in the region have different mechanisms for evaluating research through standing committees. For example, the Sokoine University of Agriculture has a standing research and publications committee both at the faculty and Senate levels.

The evaluation of donor-supported projects is coordinated by the directorates of research within the ministries. In general, directors and chief research officers bear heavy responsibilities in the review exercises, which are often executed by external reviewers. Donor-supported research projects normally have built-in provisions and procedures for research evaluation.

Out of the SADCC countries evaluated, none except Zambia had any formal policy on agricultural research evaluation. Agricultural research evaluation, however, is implied in terms of service for the directors of research, chief research officers, and heads of research institutes and sections. Zambia has already recognized this weakness and has drawn up and approved a formal policy on monitoring and evaluation. Zimbabwe is also in the process of formulating a similar policy.

Agricultural Research Evaluations Undertaken

The study revealed that there were almost no formally established structured procedures or strategies for carrying out agricultural research evaluation within national research systems. The respondent from Zambia, however, indicated that in his country there were established procedures for evaluation. Such procedures were an integral part of the workplan preparations and progress reporting and included annual reviews and visits by the chief research officer to research centres.

In Botswana and Tanzania, the procedures varied and were dependent on the experience of the senior scientists and heads of departments, including the director of research. In Tanzania, procedures and strategies were developed when found necessary. In the six SADCC countries studied, donor-supported agricultural research projects and programs generally had the benefit of well-documented and funded evaluation. Officials interviewed during the study confirmed that the purposes of and criteria adopted in evaluations were often defined and established before the evaluations were undertaken; for example, in the monitoring type of evaluations, the purposes were not generally documented.

Senior scientists and research administrators often used their experience and judgment to arrive at conclusions based on unwritten guidelines. In Botswana, one of the most important considerations in any agricultural research evaluation activity is to gauge how the research outputs integrate with the overall project/program objectives.

In both the formal and informal evaluations conducted in various SADCC countries, the three elements of effectiveness, efficiency, and impact were all considered. Evaluation exercises, however, have tended to place most emphasis on impact. Respondents felt that it was important to gauge how the research undertaken would finally influence the welfare of the farmer. In addition to impact, evaluations in the past have also placed emphasis on the effectiveness of agricultural research. Respondents from Zimbabwe, on the other hand, felt that, although attention is given to all three evaluation elements, the impact of research work will often require a period of 10 or more years before it becomes fully apparent. Agricultural research evaluations carried out to date in the six countries covered all three categories of evaluations, namely ex ante, monitoring, and ex post. The ex post category of evaluation was more usual with donor-agency supported research than with nationally supported research.

The farming systems research (FSR) project in Lesotho, for example, had undertaken four formal evaluations since its inception in 1979. Monitoring evaluations took place in 1981, 1983, and 1985. In April 1986, an ex post evaluation was in progress. Before the project was initiated in 1979 there were serious consultations at various levels in the government concerning the scientific soundness of the proposal, the likely impact of the research, and the adequacy of resources for the project. Such an appraisal of the program constituted the ex ante evaluation. The respondent in Botswana further indicated that two other ex ante evaluations were conducted each year in 1982 and 1983 with the initiation of new external donor-supported projects. In addition, there have been three in-depth monitoring and four ex post agricultural research evaluations between 1982 and 1985 on external donor-supported research projects. It was concluded that, in general, all three categories of agricultural research evaluations were carried out in all six SADCC countries studied. Officials interviewed favoured the idea of having evaluations at least at annual intervals.

Generally, agricultural evaluations have been done at the project level in most SADCC countries. The evaluation done at the Uyole Agricultural Centre in Tanzania, however, is an example of an evaluation at the institute level. Another similar example is the evaluation of the International Development Research Centre (IDRC) supported projects at the Sokoine University of Agriculture in Tanzania. The SADCC study in 1984 in the SADCC region is a useful example at the system-wide level. The lack of system-wide periodic evaluations was seen as a major weakness in most of the countries visited.

Most of the intensive agricultural research evaluations in the region have made use of external reviewers and consultants. In external donor-supported research projects, local input has often taken the form of providing the information needed for the evaluation. Local scientists in such situations normally have a chance to react to the evaluation report before implementing any recommendations.

The desire of national scientists to play an increasing role in periodic formal systematic evaluations was expressed by all respondents. In this connection, respondents felt that the cadre of local scientists versed in evaluation methodologies needs to be developed and improved. The need to make more effective use of senior and experienced scientists in the region was also expressed, and SACCAR was seen as an appropriate organization to facilitate this coordination.

For regular agricultural research evaluations (ex ante and monitoring types), the officials interviewed felt that scientists and research managers should continue to serve as evaluators. Zimbabwe supported this and also felt that consultants (national or external) should be used only in specialized cases. In Zimbabwe it was felt that research output users (beneficiaries) should also have a role in assessing agricultural research. The desirability of having a formally established agricultural research evaluation unit was expressed in Zambia. Such a unit would include the research team leaders, research managers, and the chief research officer. Methodologies employed in systematic agricultural research evaluation varied widely from one project or program to another and also to some extent from country to country. Interviews were the most common methods of evaluation, followed by peer reviews and the use of questionnaires. All respondents interviewed felt that no single methodology was adequate by itself for assessing agricultural research. Thus, a combination of methodologies is employed.

Agricultural Evaluation Findings and Uses

The study revealed that previous and ongoing agricultural research evaluations in the region have been greatly valued and have, therefore, found use in the respective national research systems. For example, the 1983 evaluation in Lesotho resulted in a recommendation that the FSR approach be adopted at the national level. In Zambia, a wheat research evaluation supported by the Canadian International Development Agency (CIDA) resulted in recommendations that had a bearing on university training and expansion policies. Similar examples were available from other countries in the region. It may be true that such evaluations have been a significant factor in determining agricultural research policies and priorities in the region.

There was a general agreement in all the five countries visited that agricultural research evaluations helped to (a) guide the direction of research, (b) guide the recruitment needs for research, (c) gauge training needs for the agricultural research sector, (d) guide the allocation of financial resources and support staff for research, and (e) streamline the coordination and management of research. In addition, evaluations have been useful when making decisions on whether to continue, terminate, or change a particular research project or program.

The findings clearly demonstrate the usefulness of research evaluations made in the SADCC region. The foregoing sections reveal that some of the findings from the respective agriculture research evaluations have had substantial implications at the project/program, institution, and national levels. Thus, evaluations must be taken seriously and much can be gained by making use of well-trained and experienced personnel to guide the evaluation processes. The need to have well-constructed, written procedures for evaluation was also obvious. In most SADCC countries, the profile of local research scientists appears to lean heavily on the younger, more inexperienced side. There seems, therefore, to be an urgent need to strengthen the capacity of agricultural research systems in some way. There was evidence to suggest that those officials, especially directors of research and chief research officers, active research scientists, and policymakers, tend to be the most frequent users of agricultural research evaluation findings. Most respondents also felt that senior scientists and research team leaders benefited from such evaluations.

Table 2. Staff and funds involved in agricultural research evaluation, Lesotho (in USD).[a]

	1981	1982	1983	1984	1985
Number of local staff[b]	13	13	13	13	13
Number of external consultants[c]	3	—	3	—	4
Estimated funds involved from local contributions	n.a.[d]	n.a.	n.a.	16380	16380
Estimated funds involved from external sources	21300	—	21300	21300	23648

[a] USD = United States dollar.

[b] Assuming that each scientist at the senior level spent 30% of his or her time on matters related to agricultural research evaluation.

[c] Excluding the eight expatriate staff based in the farming systems research (FSR) project in Lesotho.

[d] n.a. = not available.

Provisions for Agricultural Research Evaluations

External donor-supported agricultural research normally makes provision in terms of personnel and financial support for evaluation. In a country such as Lesotho where the FSR project makes up the major part of the agricultural research system, adequate evaluation cover was felt to be provided.

Respondents from the six countries felt that provision should be made in research budgets to facilitate well-organized, periodic evaluations. The Zambian respondent was prepared to allocate up to 10% of the annual research budget, provided evaluations were done three times a year. Zimbabwe, Tanzania, and Lesotho welcomed the idea of resource allocation but did not think that the resources devoted to this should be fixed. Botswana favoured the idea of using the personnel and resources already devoted to agricultural research. The official from Swaziland felt that it may be difficult to obtain separate funds for agricultural research evaluation and, therefore, also supported the use of existing research personnel and funds.

Currently, no country in the region has a separate vote for agricultural research evaluation from internal sources. Evaluation, therefore, continues to be done using the existing research personnel and funds. As an example, Table 2 indicates the number of staff and funds committed to agricultural research in Lesotho. In this country, the director of research and nine heads of departments are each assumed to devote 30% of their time to evaluation-related matters. From Table 2 it appears that about 1% of the total agricultural research budget went into evaluation in 1984. Similar estimates were not attempted in the other countries where the research systems are more complex.

The need to have adequate expertise to assess agricultural research comprehensively has already been mentioned. Current shortcomings in this area could be resolved in the longer term by (a) a carefully planned training program, (b) employing in monitoring and evaluation a mechanism for expatriate staff to fill the gap in the near to medium term, and (c) by promoting regional cooperation in research evaluation. SACCAR could provide a framework for senior scientists from the region to assist on a regional basis.

Need for Evaluation: Uses and Users

Institutionalizing Review and Evaluation in National Agricultural Research Systems

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The formulation of an annual program and budget of a research institute is normally preceded by data collection and analysis and a review and evaluation of past experience. Review and evaluation is a continuing process, and many research institutes and national agricultural research systems in developing countries formalize the activity as part of an effective planning procedure. To increase the objectivity of this process, some national agricultural research systems supplement the internal with external review and evaluation through the involvement of scientists and research managers from outside the organization or the country.

Significant progress has been made in agricultural research capacities in many developing countries. Political and financial support to agricultural research, however, is still fragile. External as well as internal reviews and evaluations should, therefore, be oriented toward assisting research leaders and managers in (a) building a healthy research policy environment, (b) developing a strong scientific manpower base, and (c) improving the effectiveness and efficiency of research. With the present level of international support, it may take another 15 years to get the national agricultural research systems of developing countries to a stage of self-sustaining growth.

Organizing Effective Review and Evaluation

In this paper, the term review and evaluation (R&E) is used instead of evaluation. An evaluation normally measures research performance against a given set of criteria, whereas a review reassesses, in addition to measuring performance, those criteria against which project or program performance is evaluated.

There has been promising growth in improvement in agricultural research capacities in developing countries during the last 10 years. To maintain momentum, constant checking and rechecking of progress is necessary. Regular analysis, reviews, and evaluations should monitor whether

(a) Funds are effectively allocated to the productive research workers;

(b) Research programs and activities are impact and development oriented, that is they meet farmers' needs and the expectations of legislative, planning, and financing bodies to ensure continuous political and financial support;

(c) Research results are properly disseminated and applied;

(d) Communication is effective between researchers, farmers, farming enterprises, extension, education, agricultural support services, and policy-makers; and

(e) The development of manpower and physical facilities is adequate.

Research institutes and national agricultural research systems (NARS) formalize R&E activities as part of the planning process. Formulation of the annual program and budget of a research institute is preceded by a review and evaluation of past experience. During program implementation, additional information and facts will become available. Analysis of these data may lead to the modification of approaches and the adjustment of assignments and budgets. Data collection and analysis, modification of approaches and objectives, adjustments of assignments and budget, and R&E occur, indeed, on a continuing basis.

Financial support and technical assistance from international funding and donor agencies have stimulated the establishment of NARS in developing countries. The agricultural leadership in these countries realizes that a certain level of national capacity is required to allow the country to utilize new technologies generated by the world's agricultural research community. Yet, the political support from within the country for agricultural research is generally still fragile. Farmers of developing countries do not have strong lobbies in legislative, planning, and financing bodies. It is hard to secure and maintain sufficient levels of funding from the government for agricultural development and for agricultural research particularly. R&E, especially external R&E, should help NARS in strengthening this political support for agricultural research.

First, R&E reports should be directed toward the research leaders and research managers, as well as to the policy- and decision-makers, to create awareness and understanding among them about the importance of agricultural research in increasing food and agricultural production.

Second, analysis of the contribution of research to development and constraints on the effectiveness and efficiency of agricultural research must be given a major place in every type of R&E report. Measuring the impact of research is difficult, and there is no satisfactory methodology yet to do it. Nevertheless, every effort must be made to reflect the contribution of agricultural research to development in an R&E report. In Indonesia, new research institutes established in West Sumatra and South Sulawesi have created a better understanding of agriculture among the development professionals of the region. The scientists have functioned as resource persons in planning and implementing agriculture development projects and in testing technologies generated elsewhere in the country or abroad. They have also built up technical and moral support in the agricultural extension services of the region. All this happened before the institutes concerned were fully established and before they were in the position to generate research results of their own. Investment in agricultural research does not need a long gestation period to produce impact. Such contributions are usually not recognized or are underrated by external R&E teams.

Third, every NARS must have some good examples of productive application of research results by farmers, such as the now more than 6×10^6 ha planted to the high-yielding rice varieties in Indonesia, the control of the disastrous rice brown hopper and its monitoring device introduced by scientists, the introduction of a short-maturing soybean variety to enable farmers to grow soybean as a second or third crop within a rice-based cropping system, the introduction of domestic coconut hybrids, the application by smallholders of a simple mechanical control method of the cacao pod borer, and the effective control of a sudden explosion of a bacterial disease in fish ponds. Such concrete examples appeal to policymakers.

Fourth, in R&E reports of projects with foreign technical assistance, problems such as the insufficiency of operational funds for research and its alternative solutions should be carefully analyzed and solutions sought. Experience shows that it is hard for any NARS to expand its budget with the same rate of growth in capital investment for research infrastructure and manpower development funded by external resources.

Fifth, service conditions for agricultural scientists in developing countries do not encourage the recruitment, expansion, and retention of good staff and its full commitment to research. But, nonetheless, development of the scientific manpower base is essential for every NARS and calls for constant review and evaluation.

Sixth, style and tone of an R&E are of paramount importance. There are excellent R&E reports that could blend rigorous critical analysis with clear messages of reinforcement and encouragement to the young and still vulnerable NARS of a developing country.

The Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR) has long-standing experience in conducting external program and management reviews of the International Agricultural Research Centres (IARCs). During the last 5 years, the International Service for National Agricultural Research (ISNAR) has conducted a series of reviews of national agricultural research systems. It will be helpful for NARS if both the TAC of CGIAR and ISNAR were to compile all their R&E findings, with commentaries on their usefulness, and disseminate them to research leaders and managers of NARS in developing countries.

Overcoming Weaknesses in External Review and Evaluation

There is often a bias in external R&E activities toward planning and setting of priorities. Many research institutions in developing countries have a shortage of experienced scientists. Programs and projects have to be built around productive research workers and their respective fields of expertise. Supporting services and available resources are focused on researchers with a high probability of success. It is the old and sound "productive people" approach. In its early stages of development, the institute may not have clear planning procedures and priorities, but if its limited number of scientists can demonstrate their abilities for productive, impact-oriented research, they deserve encouragement. In the evolution of the institute proper, these productive scientists will function as nuclei in formulating a more comprehensive research program as other qualified staff accumulate on the site.

The Agency for Agricultural Research and Development (AARD) in Indonesia identifies productive scientists by rating their performance into four categories and nine levels. Categories I and II each have two levels for assistant scientist and associate scientist, respectively. Category III has two levels for senior scientists, and category IV consists of three levels for principal scientists.

The productive scientists are those rated under categories III and IV. There are at the moment 111 senior and principal scientists at AARD. To double the number in the next 5 years, AARD has institutionalized a reentry program to involve immediately new holders of PhDs in research after they return from training. At present, there are at AARD 137 PhDs, 314 MScs, and 1284 BScs. In addition, there are 104 PhD candidates and 321 MSc candidates in training at universities in Indonesia and abroad. It is expected that a PhD graduate will qualify for category III, the senior scientist level, in less than 5 years. Thus, in addition to the scientists under categories III and IV, the new PhDs get priority in receiving research funds. I believe that the reentry program for staff who return from their training and the productive scientist approach in assigning research and allocating budgets referred to earlier are sound approaches toward productive research.

Setting research priorities and formulating an institute's research program as a translation of the institute's mandate is work for a team. If an institute only has three senior scientists, including the director, and if the director, with the help of local or foreign consultants or both, manages to produce a comprehensive research program, who is going to implement this program? It is very risky and in many cases wasteful to assign research projects and allocate funds to unqualified staff. Training of prospective scientists of the institute is always a more profitable and rewarding alternative investment. But a NARS must indeed have some in-house capacity for formulating a comprehensive plan for establishing a new or for strengthening an existing research institute and in preparing a project proposal and request for funding.

Three groups of foreign and local consultants are normally involved in the preparation, implementation, and the R&E of the project. But at implementation there are, in my experience with AARD in Indonesia, always costly and time-consuming changes to be made in the construction of laboratories and the ordering, purchase, and installation of laboratory and field equipment. R&E teams can do little to prevent or reduce immediate wastage, although they are able to identify and quantify the loss and recommend its future reduction.

If the lifetime of a foreign-assisted project in institution building of NARS could be extended from the normal 5 years to 10 years, the first half of the project period could be used for training so that detailed planning of construction work and the ordering and installation of expensive equipment could involve scientists specially trained for the project. This would subsequently minimize losses. This is the "plan as we proceed" approach, which can be very effective for developing countries that have to plan with limited data, experience, and expertise, but is understandably less acceptable to the funding agencies.

Another form of wastage in foreign-assisted projects is caused by the unbalanced growth of the research infrastructure, manpower development, and the expansion of the domestic research budget. Physical facilities established and equipped could be underutilized for a couple of years, waiting for the trained staff to return to their duty. Research managers could experience difficulties in maintaining the research facilities and in having at the same time sufficient operational funds to involve immediately the newly trained staff in research.

It would be ideal if external support from international and donor agencies for agricultural research could be a mix of capital and operational funds rather than capital funds alone. This would help governments of developing countries remedy the lag in the expansion of the domestic research budget and enable research managers to mobilize fully the new and highly trained staff immediately in research. There might be other solutions to this problem that the R&E could find out.

We often read criticism in R&E reports about incongruities in the allocation of resources when research funds are not allocated to commodities that, according to their contribution to the country's agricultural gross domestic product (GDP), are of higher priority. If this incongruity exists because management follows the productive people approach to secure results, then criticism may not be so justified.

Language in Indonesia is a problem for external R&E teams. There are, for example, plenty of laudatory reports on the impact of research on rice production in Indonesia. The impact of research on the sharp increase of maize and soybean yield and production in the last 5 years and on the rapid expansion of oilpalm and cacao with the use of high-yielding clones and the accompanying improved technology is no less dramatic than rice but it is less understood. Why? Because much of the research on rice has been published in English in collaboration with foreign scientists who are assisting AARD in rice research, whereas most of the publications on maize, soybean, oilpalm, and cacao are written in the Indonesian language.

With the examples illustrated in the foregoing, I suggest that R&E activities in NARS of the developing countries for the next 5–10 years be more oriented toward assisting research leaders and managers in (a) building political and financial support for agricultural research, (b) developing a strong scientific manpower base, and (c) improving the effectiveness and efficiency of agricultural research. Planning and setting research priorities is a productive exercise for research institutions and NARS, which already have a reasonable critical mass of expertise.

Types of Review and Evaluation

I recently took part in a review and evaluation that did not have clear terms of reference as to whether it was an institutional R&E or a project R&E. What we had to look at was a project to develop an infrastructure for agricultural research on food crops in Sumatra, including upland and rainfed rice, irrigated rice, tidal swamp rice, maize, grain legumes, tuber crops, and the related farming systems and to strengthen problem-oriented research on those food crops. The implementing agency was the Sukarami Research Institute for Food Crops (SARIF), which is strategically located in the centre of the island of Sumatra. SARIF's mandate is, however, not limited to the island of Sumatra. It has a national mandate to do research on upland and high-elevation rice and related farming systems practiced by more than 2 million farm families all over Indonesia. The R&E team had dificulties in asking the right questions and getting straightforward answers.

Nonrice upland crops, rainfed, irrigated, and tidal swamp rice do not fall under SARIF's mandate. What will SARIF's role be in the management of the experimental farms specially developed by the project in Sumatra for those crops when the farms are fully established? Are there working arrangements developed between SARIF or the project and the other AARD research institutes in charge of research on the commodities of the project that do not belong to the SARIF mandate? Will all the scientific staff trained under the project work for SARIF when they return from their graduate studies?

It is clear that the mandates of SARIF and the project are compatible, even if they are not similar. The team actually conducted two types of review, a project and an institutional review. I, therefore, welcome the distinction by this workshop of different types and levels of R&E. I suggest that the workshop addresses three types of R&E: (a) institutional, (b) program, and (c) project R&E. The evaluation of the performance of individual scientists, included in the agenda of the workshop, should be treated as part of the three types of R&E suggested. This evaluation is indeed essential for (a) the allocation of research funds, (b) building a career ladder for scientists, and (c) developing the scientific manpower base of NARS.

In 1981, AARD invited ISNAR to conduct an R&E of the AARD system in Indonesia. The R&E was successful in strengthening financial support to AARD from the Government of the Republic of Indonesia, the World Bank, the United States Agency for International Development (USAID), and other donor agencies and accelerating AARD's program of manpower development. As a follow-up, ISNAR was requested by AARD to conduct a series of external program reviews that cut across the mandates of individual research institutes to assist the AARD management further in improving the effectiveness and efficiency of research and in building financial support to agricultural research. The R&E teams were composed of foreign and Indonesian scientists and agricultural research managers. The first of the series of program reviews was, however, too much influenced by the approaches taken by TAC–CGIAR in its external program and management reviews of the IARC, where staffing and research facilities are adequate. They were more of the institutional R&E types, and were less oriented to building political and financial support from within the country. The reviews, however, eventually gave the AARD management an independent assessment of research down to the level of the scientist. It allowed AARD to rationalize the use of its resources and put research activities into fruitful avenues. Another important contribution of the program review is that the AARD institute directors have, through the questions, answers, and comments during the R&E, learned much about the practice of agricultural research management.

Project R&E is probably the most familiar, if not the most popular, type of R&E to leaders of NARS of the developing countries. Organizing procedures of funding, purchasing of equipment, land development, designing and constructing laboratories, and training of staff and recruiting of foreign experts are normally the main problems and the focus of attention in project R&E reports. But, as stated earlier, increased attention of international and bilateral donor agencies toward strengthening agricultural research in developing countries in the form of technical assistance and institution-building projects during the last 10–15 years has created momentum in building NARS of the developing countries. R&E reports will also have to be written on these projects.

Fostering Cooperation among NARS

In October 1977, a group of agricultural research leaders from Africa, Asia, and Latin America convened at Bellagio, Italy, to discuss the potential for cooperation among NARS. The group had every hope that enlightened leaders of developing countries would give priority and support to establishing a dynamic agricultural research capability to increase agricultural production. The group also welcomed the broad international interest emerging at that time on this goal and on providing certain services common to the national programs to facilitate direct cooperation between the research systems. The conference in Bellagio discussed, among other things:

(a) Topics of mutual concern to the national agricultural research systems and the specific ways their progress could be accelerated,

(b) Strategies for generating support for national agricultural research programs,

(c) Alternative approaches for getting research results out to the end users — the farmers and the public policy decision-makers, and

(d) The feasibility of establishing an appropriate mechanism for regular meetings among leaders of NARS.

The conference resolved to establish an International Federation of Agricultural Research Systems for Development (IFARD) to provide an institutional framework for sustained and concrete activity of research systems in developing countries. In September 1979, the First IFARD Global Convention was held in New Delhi, in conjunction with the Golden Jubilee Symposium of the Indian Council of Agricultural Research (ICAR), and on 10 September 1979 IFARD was formally incorporated. Since then, IFARD has conducted nine regional meetings in Africa, Asia, and Latin America dealing with prevailing issues related to strengthening agricultural research systems in the regions. IFARD believes that periodic meetings among agricultural research leaders and managers in these parts of the world will provide a good forum and opportunities for NARS to (a) monitor progress made by developing countries in building and strengthening NARS, (b) exchange information and share experience in solving problems and overcoming constraints of institution building, and (c) find specific ways for accelerating progress through direct cooperation.

The periodic regional meetings are normally combined with technical workshops of the kind we are conducting now. There is no doubt that know-how and skill in agricultural research management of developing countries are improving significantly. There is now a good number of scientists and research managers of developing countries who have practical experience with external R&E of NARS in developing countries or who have participated in program and management reviews of the IARCs.

Future Activities

Some of the NARS of developing countries have now built research capacities capable of responding to the needs of the farming community and to supporting and orienting efforts in agricultural development. The number of scientists active in agricultural research is increasing rapidly, the quality of research is improving, and there are many successful examples of productive interfaces with extension, the agricultural support services, and the farming community.

In many developing countries, however, agricultural research still does not get adequate political support and it is not accorded high priority. Research infrastructure and scientific manpower are fragmented between various ministries, departments, and semi-autonomous agencies. Each is too weak to make meaningful contributions to agriculture and rural development. Service conditions do not encourage the recruitment, growth, and permanency of good staff. Although encouraging progress has been made during the last 10–15 years, I believe that with the present level of international support, it will take another 15 years to get the NARS in developing countries to a stage of self-sustaining growth.

Governments of developing countries should realize that they have the prime responsibility for providing resources for their own national research system. Reinforcing the base of scientific manpower through appropriate training programs should be given first priority. Research scientists should be accorded recognition, salaries, and other incentives equal to those given to agricultural professionals in management positions. Also, because we are researching for development, to promote welfare, it is essential that we develop knowledge about and understanding of our clients, the farming population in particular. Communication between research and extension, and the agricultural support services, and between research and planning agencies and policymakers should be strengthened and streamlined. Agricultural research must show an impact on the agricultural, social, and economic development of the country. These are important requirements for building a national agricultural research system. They normally constitute the main issues addressed at workshops on research management of the NARS. Those issues must be considered and analyzed carefully in every type of R&E activity.

I suggested earlier that the three areas of concentration for future activities of NARS of the developing countries should be building a healthy research policy environment, developing a strong scientific manpower base, and improving the effectiveness and efficiency of research. An in-depth analysis and evaluation of those three areas of concentration will be conducted at the First International Meeting of Leaders of National Agricultural Research Institutions to be held on 6–11 October 1986 in Brasilia, Brazil. This meeting will be combined with the Second IFARD Global Convention and the Regional Meeting of the IFARD Chapter for Latin America and the Caribbean. In 1987 and 1988, two regional meetings are planned for Africa and for Asia. The theme for the IFARD Africa Chapter meeting will be on building a healthy policy environment for agricultural research. The IFARD Asia Chapter will address the problem of improving the effectiveness and efficiency of agricultural research networks in Asia and the South Pacific.

Evaluation of Research in Indian Agricultural Universities

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The 23 State Agricultural Universities (SAUs) have the responsibility for agricultural research in the different states of India. The Indian Council of Agricultural Research (ICAR), a national body, buttresses, backstops, and coordinates the research activities of SAUs, through direct participation and part funding and coordinating, and functions as a national policymaking body.

Although the need for evaluation is widely felt, very few SAUs, if any, developed evaluation policy, procedures, and systems. Except in five SAUs, where there are central units assigned with the task of evaluation inter alia, evaluation functions are generally discharged by the director of research with the assistance of some committees as part of the director's planning, controlling, and coordinating responsibilities. Allocation of specific staff and funds for evaluation is an exception rather than a rule. Evaluation is mostly done by research managers and scientists of the same organization. A few SAUs use consultants within the country. Specific methodologies are neither developed nor used for evaluation. Overall judgment/assessment forms the basis for evaluation. The main purpose of evaluation is to enable managers to decide on the initiation/continuation of the project/program and to formulate extension recommendations from research findings.

Evaluation of research in Indian agricultural universities is inadequate. There is a need to develop a reliable and effective evaluation system and procedures for the SAUs. There is also a need to delineate the concepts and scope of evaluation. Efficiency and impact should serve as useful criteria for evaluating research in SAUs. The periodicity of evaluation can vary, depending on the levels, from 3 to 5 years. A mix of scientists of the institution, specialists, consultants, and end users of technology should be chosen as evaluators.

The critical role of research in agricultural development in India was perceived as early as in 1929 when the Imperial (renamed as Indian) Council of Agricultural Research (ICAR) was established following the recommendations of the Royal Commission on Agriculture. The departments of agriculture in the states, which have the responsibility for agricultural development, also established facilities for research in the respective states. Some of the commercial crop (commodity) committees (e.g., tobacco, cotton, coconut, etc.) supported research either through their own research centres or by funding projects operated by the state governments. This, more or less, formed the research infrastructure of India until 1960.

State Agricultural Universities and Their Role

One of the most significant events in Indian agricultural development during the past quarter century is the establishment of agricultural universities. The first of these institutions was established in Uttar Pradesh in 1960, and within a decade most states have established at least one agricultural university. Now there are 23, excluding the two national institutes of ICAR, which are deemed universities, one in each of the 14 states, two in one, three in one, and four in another. (A complete list of the state agricultural universities is presented in the Appendix to this paper.)

The State Agricultural Universities (SAUs), modeled after the American Land Grant system, are service-oriented institutions, their clientele being the farmers. They have a triple function: training the agricultural manpower required by the state (education), generating new knowledge and technologies (research), and disseminating these (extension). SAUs are state-supported institutions, about 60 to 70% of their funds coming from their respective governments, 25 to 35% from ICAR, and about 5% from other sources. They have strong linkages with ICAR, which, as a part funding and coordinating agency, has considerable leverage with these institutions and indeed plays a significant role in shaping teaching, research, and extension activities of SAUs.

With the establishment of SAUs, teaching and research, which formed part of the responsibilities of the Department of Agriculture (DOA) in the states, were transferred to these new institutions. Although extension is one of the legs of the tripod of the SAUs, the role is limited to providing technical backstopping to the DOAs of the states that continue to discharge the role of directly serving the farmer by disseminating newer and profitable technologies and monitoring and regulating supplies of inputs, etc. Most states reorganized their extension network on the pattern of the training and visit (T&V) system with financial assistance from the World Bank. Most SAUs are, therefore, content with limiting their role of extension to institutional training in extension methods, disseminating extension recommendations based on the technologies generated, and training key extension personnel, especially the subject matter specialists of the DOA. The direct involvement of most SAUs in the field is limited to a few Krishi Vigyan Kendras or farm science centres, operational research projects (ORPs), and lab to land (a sort of frontline extension activity) etc., which at best serve as a cutting edge and pacesetters for the DOA with which the universities have established strong links. A few SAUs, however, undertake extension work in villages with no clearcut division of labour between the SAU and DOA.

The responsibility for agricultural research in the states is borne by the SAUs with ICAR playing a coordinating and supporting role. Indeed, about half of SAUs' scientific manpower and financial resources are committed to research — about 10000 professionals with an estimated financial allocation of INR 800 million (12 Indian rupees [INR] = 1 United States dollar [USD]). Most SAUs have several research centres with laboratory and field facilities and adequately trained scientists. This research infrastructure was further strengthened through the World Bank-assisted National Agricultural Research Project (NARP) administered by ICAR and implemented by the SAUs. The main objective of the project is to strengthen the research capabilities of SAUs in the different agroclimatic regions of the states. Phase 1 of NARP was completed in 1985, and a 7-year second phase is now in progress.

ICAR, which itself was reorganized in 1965 with a much wider role and responsibilities, buttresses the research activities of the SAUs through 40 national institutes, 4 national bureaus, and 6 national centres. The Council operates 72 All Indian Coordinated Research Projects and 6 Project Directorates in which the SAUs participate extensively through their cooperating centres. ICAR also supports several ad hoc research projects of short duration (3–5 years) implemented by SAU. Research support for agriculture outside the ICAR/SAU system is minimal.

Research Organization in Agricultural Universities

All SAUs have directorates of research at the headquarters. Typically, the staff consists of a director of research assisted by two or three associate/deputy directors, an economist, a statistician, and some supporting staff. A research council or a research advisory committee consisting of senior administrators, scientists, and, in a few cases, some farmers, functions as a body for policy formulation, coordination, and review of research programs. Research proposals generally are initiated by individual researchers or interdisciplinary groups, reviewed by the heads of departments and approved by the research committee/council. The director of research is responsible for implementation of the program.

Existing Evaluation System

The need for continuous evaluation of SAU activities, teaching, research, and extension, has been widely recognized. The Review Committee on Agricultural Universities, appointed by ICAR, in its report submitted in 1978, observed that planning and evaluation is the weakest link in the management and development of agricultural universities and made specific recommendations for (a) establishment of planning and evaluation units by all SAUs, (b) preparation of an overall perspective plan of universities, and (c) carrying out evaluation studies on select aspects of university functions. The committee has further recommended that every 5 years ICAR should appoint evaluation/achievement audit committees for reviewing the progress of each agricultural university and that each SAU should have its performance reviewed periodically by an evaluation committee. Although ICAR did not appoint achievement audit committees as recommended, a few universities (e.g., UAS, GBPUAT, KAU, and APAU) have appointed committees to review progress.[1] These reviews, which covered the whole gamut of activities of SAUs, do not, however, adequately serve the purpose of research evaluation as envisaged in this discussion.

Five of the 23 SAUs (UAS, HAU, KAU, JNKVV, and SKUAST) established planning/monitoring and evaluation (M&E) units. These units/cells are staffed by two or three scientists and some supporting staff. Only two out of these five SAUs have specifically mentioned evaluation as the primary task of these units. In the other universities, these units are designated as planning and monitoring units. Although the names of these cells differ, the tasks performed are much the same — to prepare a perspective plan of the university development; collect, collate, and maintain the statistical information relating to staff, budget allocations, etc.; evaluation/appraisal of specific project proposals; and review of specific projects. Clear policies and systems of evaluation have not been developed even by the two SAUs that have M&E cells.

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[1] See the Appendix for the full names of the universities.

Some of the evaluations recently conducted by the M&E cell of HAU, are listed in the following, but, although the studies are relevant and useful, none of these relates to the evaluation of research:

- An economic evaluation of the credit/subsidy extended by the Small Farmers' Development Agency (SFDA) in Ambala and Hissar districts (Haryana);
- Dynamics of Haryana agriculture;
- Socioeconomic impact of rural development programs on beneficiaries (a case study of the District Rural Development Agency (DRDA) of Jind, Karnal, and Sirsa);
- Research and extension resource allocation pattern of changing agriculture in Haryana; and
- Role of farm service centres in the transfer of technology (a case study of Karnal and Mahendranagar districts).

The project planning and monitoring cell of UAS conducted a performance appraisal of the university over a 15-year period. Research is one of the activities reviewed, focusing on the analysis of the resource base of the UAS research set up and on analyzing the research efforts of the schemes and of the postgraduate research effort. Evaluation per se did not get adequate attention in this study. A team of consultants reviewed the whole range of activities, including research, of APAU in 1986. Here again research activities were only generally reviewed falling very short of evaluation. JNKVV, Jabalpur, appointed a committee to review the research projects of the university in 1983. Although the committee completed its work and made some recommendations, no report was prepared and published.

Most SAUs (75%), do not have cells/units with full-time staff for evaluation. But all these institutions are conducting an evaluation of sorts through the research advisory councils, research evaluation councils, or the directorates of research. Evaluation is often used loosely to encompass appraisals, monitoring, and processing research results into production technologies and extension messages. The following concluding statement of one SAU vice-chancellor after describing, at considerable length, the evaluation systems, procedures, findings etc., in his organization, sums up the typical situation: "In the end, it may be concluded that there is hardly any well defined evaluation system. Some definite system of evaluation with proven effectiveness needs to be introduced."

ICAR assists SAUs in implementing several All India Coordinated Research Projects, which are generally commodity or discipline oriented. These projects are headed by a project coordinator who is a scientist appointed by ICAR to coordinate and oversee implementation of the project located at and operated by SAUs. Monitoring and evaluation of these projects through visits and annual workshops form part of the responsibilities of the project coordinators. Technical programs of these projects are formulated on the basis of an annual workshop at which time the progress and implementation of the programs in the different centres are reviewed/evaluated and new programs for the next year are drawn up. In addition, ICAR appoints two or three consultants periodically, usually once every 5 years, to review the performance of these projects. There are no clear-cut methodologies used either at the workshops or during the periodical reviews. The report of the periodical review is available to the SAU for information and appropriate action where required.

ICAR, as an implementing agency, also monitors and evaluates the NARP subprojects operated by the SAUs. This is achieved through periodic visits, usually once a year, of senior scientists from ICAR. The subprojects are also evaluated in detail by a team of consultants appointed by ICAR at the end of 5 years when ICAR assistance to the project ceases. These reviews are more thorough and generally help the SAUs to improve project performance.

Neither the five SAUs with specific monitoring evaluation units nor others that have stated that evaluation is being done by the scientists/administrators as part of the duties could quantify the manpower and financial input into evaluation. One SAU is spending INR 0.53 million/year on M&E cells but the activities are not confined to evaluation alone. At any rate, the inputs are of a very low order. Specific funds are not committed for this purpose, and the small expenditures now incurred are from the limited resources of the university.

Four SAUs have used consultants for evaluation. The number of consultants used was not specifically stated except by one SAU, which has used seven consultants so far. The consultants are from the country, but are external to the university.

Evaluation of SAU Research

All three categories of research evaluation (ex ante, monitoring, and ex post) are being done to varying degrees by all SAUs. Ex ante evaluation is not widely practiced, although its value is now being recognized as it provides an empirical basis for resource allocation. At present, it is generally limited to the relevance of the project and soundness of the methodologies used.

In all SAUs, the research advisory committees at the university level and at the regional level meet twice a year to review the past year's results (ex post evaluation) and plan for the next season/year (ex ante). Project leaders, research scientists, and extension workers interact before projects are finalized. In practice, the whole exercise is cursory and, at a macrolevel, hardly permits any in-depth analysis.

About half of the SAU research evaluation committees meet to identify specific technologies to be developed as production recommendations, but this function is performed by the research advisory committees at the zonal/university level in the other SAUs. The director of research is the key person in monitoring and evaluating research in SAUs, irrespective of the number and nature of committees.

Given the type of evaluations done by the scientists at the annual/seasonal meetings, it is unreasonable to expect the evaluations to be at higher than the project level. Most evaluations do not adopt any particular methodology. The statements are qualitative, based on intuitive judgment rather than any well-structured study.

Whatever the type of evaluation — formal or informal, external or internal — the focus was mainly on effectiveness. The relevance of the programs in general and the output, as measured by publications and technologies generated, received major attention. The costs of research and the benefits that accrued have seldom figured in these evaluations. Nor are any serious attempts made to measure the impact in terms of either benefits to the end users or production increases in the state. SAUs have systems of evaluating individual scientists annually and periodically, but these are not linked to research evaluation. Staff evaluation is generally independent of the project/program evaluation and published work is of considerable importance in this exercise.

In spite of the lack of a systematic approach, the feedback obtained from the evaluations is used by the top and middle-level research managers as a guide to allocating resources, deciding on the continuation/termination of projects, and effecting some midcourse corrections of projects/programs.

Need for Evaluation Policy and Procedures

Agricultural universities are state-supported institutions established with the specific objective of serving the farmers and enabling them to increase production with profitability and generally to raise the standards of farming and related activities. One of their main functions, in fact the most significant one, is research for which nearly 50% of their scientific and financial resources are committed. With mounting demands on the resources and increasing accountability for the funds spent, SAUs feel the need for a fairly reliable system of evaluation to maximize returns from the scarce resources.

Evaluation of agricultural research is a complex task. At present, the term is being used loosely to mean different things by different people. The first requisite is to delineate clearly the concepts and scope of evaluation. Once the why and what are stated in precise terms it is relatively simple to answer the other questions of who, how, when, etc.

Research evaluation is a management tool. It helps to set priorities, allocate resources, pinpoint and clear bottlenecks, identify productive staff and research methodologies, and generally helps in getting maximum returns on the investments made. The focus of evaluation depends, to a considerable extent, on the levels of evaluation and the time frame. For instance, at the project level, the technical process is emphasized and, at the institutional level, impact figures prominently, whereas efficiency is relevant at both levels. Similarly, in the short run, it is hardly possible to measure impact. In the evaluation of individual scientists, output as measured by the published work plays a key role.

Improving their ability to generate technologies useful to the farmers and maximizing the efficiency of resource utilization should be the aim of long-term research evaluation in SAUs. Thus, efficiency and impact are the two areas to be evaluated. All other criteria — relevance, technical quality, individual performance, etc. — are covered while evaluating for impact and efficiency.

It is often argued that impact is too complex to be used as an evaluation criterion in agricultural research. Agricultural development is not a function of technology alone but is dependent on a host of other factors — physical, biological, and socioeconomic. The uniqueness of agricultural research lies in this fact, which is often used as an alibi for poor-quality research and technologies. Many technologies developed by research centres fall by the wayside on their journey from these centres to the farmers' fields. Poor and inadequate extension is blamed for the low adoption of technologies generated by research. But even improved extension methods have not resulted in increased uptake of these technologies by farmers. In reality, low profitability or impracticability, or both, of the technologies are often at the root of the problem. The need to evaluate research based on the utility of the results to the end users can hardly be overemphasized.

There is, however, considerable research being done in SAUs for which these criteria do not apply. Basic, fundamental research falls into this category. Even basic research, if mission oriented, would eventually serve applied research, which in turn should benefit the farmer. Thus, although in the short run basic research output is evaluated based on knowledge generated, published work, etc., over a period, impact is a good measure of an SAU's capability for research.

If evaluation is to be effective, it should be done periodically at different levels (project, institutional, and system). The periodicity depends on the level and nature of research. Usually, agricultural research projects have larger gestation periods, and too frequent evaluations are counterproductive. The higher the level the less is the frequency of evaluation. Although it is neither possible nor desirable to be rigid, periodicities of 3–5 years appear practicable.

Who should evaluate? Four categories of persons can be identified (a) scientists within the organization, (b) consultants (specialists/generalists) from within the country, (c) foreign consultants, and (d) end users of technology (senior extension officers and farmers). The number and mix of these persons depend on the level of evaluation and the nature of projects/programs. For instance, a project with a heavy bias toward fundamental science and sophisticated techniques needs specialists as evaluators, whereas a field-based project is best reviewed by persons with broad experience and background. It is desirable and necessary to employ consultants because they can devote their full time and be more objective. The higher the level of evaluation, the more the need for external consultants. In practice, a judicious mix of persons from different sources with differing backgrounds is desirable.

Applied agricultural research has several characteristic features that distinguish it from research in physical and biological sciences conducted in the laboratories. It is usually multidisciplinary, mostly location specific, and often conducted in the field open to sky and, hence, to the vagaries of weather. It requires multiyear experimentation to even out environmental influence and must be designed to cater to farmers who are numerous, scattered, unorganized, difficult to reach, and are of varied socioeconomic backgrounds. It is also a state-supported activity with all the built-in constraints of bureaucratic delays and hurdles.

These make not only the conduct of research but even its evaluation difficult. It may not be possible to lay down neat, cut-and-dried procedures for evaluation to fit into every situation. Had it been a simple, straightforward exercise, even countries with more than a half century of experience in agricultural research would not be still grappling and groping. We should not, however, be daunted by these difficulties but accept the challenge of developing implementable and reliable methodologies for evaluation of agricultural research.

Appendix

State Agricultural Universities in India

AAU (Assam Agricultural University, Jorhat, Assam)

APAU (Andhra Pradesh Agricultural University, Hyderabad, Andhra Pradesh)

BAU (Birsa Agricultural University, Ranchi, Bihar)

BCKVV (Bidhan Chandra Krishi Vishwa Vidyalaya, Mohunpur, West Bengal)

CSAUAT (Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh)

GAU (Gujarat Agricultural University, Dantiwada, Gujarat)

GBPUAT (Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttar Pradesh)

HAU (Haryana Agricultural University, Hissar, Haryana)

HPKVV (Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur, Himachal Pradesh)

JNKVV (Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh)

KAU (Kerala Agricultural University, Trichur, Kerala)

KKV (Konkan Krishi Vidyapeeth, Dapoli, Maharashtra)

MKV (Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra)

MPKV (Mahatma Phule Krishi Vidyapith, Rahuri, Maharashtra)

MSU (Mohanlal Sukhadia University, Udaipur, Rajasthan)

NDUAT (Narendra Dev University of Agriculture and Technology, Faizabad, Uttar Pradesh)

OUAT (Orissa University of Agriculture and Technology Bhubaneswar, Orissa)

PAU (Punjab Agricultural University, Ludhiana, Punjab)

PKV (Punjabrao Krishi Vidyapeeth, Akola, Maharashtra)

RAU (Rajendra Agricultural University, Samastipur, Bihar)

SKUAST (Sher-e-Kashmir University of Agricultural Science and Technology, Srinagar, Jammu and Kashmir)

TNAU (Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu)

UAS (University of Agricultural Sciences, Bangalore, Karnataka)

Evaluation of Agricultural Research in Thailand

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The paper provides a review of the monitoring and evaluation system that is used for agricultural research in Thailand. The national economy is described showing the importance of the agricultural sector. Agricultural research is conducted by eight government institutions with the Ministry of Agriculture and Cooperatives and the Ministry of University Affairs being the two most important agencies in terms of the scope and nature of the research work.

Monitoring and evaluation is analyzed within the context of the overall project planning cycle. Despite calculations that show a high return to investment in agricultural research, despite the desire to more rigorously assess projects, and despite the fact that research is vitally important under present economic conditions, monitoring and evaluation activities are neither clearly conceived nor systematically implemented in virtually any agricultural research agency in Thailand.

The Poverty Eradication Program (PEP) is presented as an example of an initiative that is well organized and incorporates a successful monitoring and evaluation system. Lessons are drawn from the Program and recommendations are given to structure and operationalize a comprehensive assessment process for all agricultural research work.

Over the past few years, Thailand's agricultural sector has faced various marketing and production problems. Both the growth rate and the export earnings of the sector have sharply declined. The government has announced its intention to encourage the development of new and better-quality commodities that have greater market potential than traditional products. Although agricultural research must play a critical role in the government's new policy, scientists and managers alike must also adhere to nationwide spending constraints. Obviously, to obtain maximum returns from limited funds, resource allocations to research need a critical review if the reorientation of the agricultural sector is to succeed. Within this context, a study was conducted, with assistance provided by the International Development Research Centre (IDRC), to review and assess the monitoring and evaluation systems that are used in agricultural research projects and programs.

Monitoring and evaluation, as well as project identification, formulation, appraisal, and approval are all integral parts of the project cycle. In turn, the project cycle is part of the overall economic development management process. Interest in any particular stage or component is meaningless unless adequate and proper attention is paid to the other parts of the project cycle and the broader economic development management issues.

The analysis of existing monitoring and evaluation systems began with an extensive literature review followed by the distribution of a questionnaire among managers and scientists who were involved in agricultural research projects. Forty-eight administrators in 19 government agencies were also interviewed. Finally, the return to research investment in general was measured, and a case study on two crops, rice and corn, was developed.

The Agricultural Sector Within the National Economy

Thailand is predominantly an agricultural economy. More than 80% of the population of 50 million is engaged in agriculture or agriculturally related activities. About 47% of the total land area, or 51×10^6 ha, is devoted to agricultural purposes. More than 65% of annual export earnings and about 25% of gross domestic product (GDP) are attributed to the agricultural sector.

Before 1976, the annual growth in agricultural output averaged 5.5%. During the period 1977–81, however, the growth rate declined to an average of 3.5%, and since that time has further deteriorated to an annual average of 2.6%. Earlier, high growth rates were mainly caused by strong offshore demand for rice, sugarcane, cassava, rubber, corn, and tobacco. These six major crops alone were responsible for about 50% of the value of agriculture production and 80% of total agricultural export earnings. Because of changing consumer preferences and increasing international competition, export markets and prices have softened for sugarcane, rice, and tobacco. Protectionism by both traditional and new trading partners has also affected the value of Thailand's exports.

Obviously, the recent and relatively poor performance of the agricultural sector has led to numerous economic difficulties. The annual growth rate in GDP dropped from 7 to 8% to the current level of 4.5%. Trade and current account deficits have risen to historically high levels. Debt servicing is now a serious concern. Attaining the national goal of eradicating rural poverty is now more difficult. At the same time, the labour force is increasing by about 1 × 10^6/year which further exacerbates the problem.

Current Development Priority

In response to the current economic difficulties, the government has instituted a strict austerity program including zero-growth budgeting. Furthermore, three key priority tasks have been identified for immediate attention: (a) to increase exports, (b) to create employment, and (c) to encourage more equitable income distribution.

Clearly, under the circumstances, the agricultural sector can no longer rely on traditional commodities and markets. New opportunities must be sought. To be successful, the redirection of the agricultural sector requires attitudinal changes in farmers, government officials, and the private sector plus a more efficiently and effectively managed bureaucracy.

After rejecting the "trickle-down" theory, realizing that many people were being overlooked in national development efforts, and recognizing the foregoing priorities, in 1982 the government launched the Poverty Eradication Program (PEP). Under the Program, 286 districts and subdistricts (34% of the national total) were declared as target areas in which more than 10 million poor people lived and worked. Essentially, the Program divides the country into poverty and nonpoverty areas with preferential treatment being given to the latter.

Administratively, Thailand is divided into 73 provinces that are further subdivided into districts, subdistricts, tambons, and villages. The provinces, districts, and subdistricts are headed by appointees of the Ministry of the Interior. Within designated poverty areas, committees are formed at each administrative level to coordinate and plan development programs. The local population or the intended beneficiaries of the PEP directly participate in decision-making at the tambon committee level. Tambon councils formulate annual and 5-year plans that when combined with other tambon plans, form the foundation for provincial plans. The provincial plans are coordinated with the National Development Plan and specifically with the PEP via the various government ministries. At the national level, the National Rural Development Committee (NRDC) has been established with the office of the National Economic and Social Development Board (NESDB) acting as the secretariat. In effect, authority for deciding policies, programs, and projects within the PEP have been delegated by the cabinet to the NRDC. The NRDC functions through various subunits including a monitoring and evaluation subcommittee. For nonpoverty areas, no special body (such as the NRDC) has been established to monitor and evaluate programs and projects. At the Prime Minister's discretion, proposals for nonpoverty areas can be submitted for approval either to Cabinet or to a council of economic ministers.

Agricultural Research

The major institutions that conduct agricultural research in Thailand are as follows

- Ministry of Agriculture and Co-operatives (MOAC): Department of Agriculture (four research institutes and 85 experimental stations), Office of the Permanent Secretary, Office of Agricultural Economics, Land Development Department (40 stations), Department of Forestry, Department of Livestock (35 stations), Department of Fisheries (42 stations), and Department of Extension;
- Ministry of University Affairs: Kasetsart University, Chiangmai University, Khon Kaen University, Prince of Songkhla University, Chulalongkorn University, Mae Joe Institute of Agricultural Technology, and King Mong Kut Institute of Technology;
- Ministry of the Interior: Public Welfare Department;
- Ministry of Education: Agricultural Colleges;
- Ministry of Industry: Sugarcane and Sugar Institute;
- Ministry of Finance: Tobacco Monopoly;
- Ministry of Science, Technology, and Energy: Thailand Research Institute of Science and Technology and the National Research Centre for Genetic Engineering and Biotechnology; and
- Ministry of Commerce: Department of Commercial Economics.

In 1984, government investment in agricultural research was roughly USD 78 million (26 Thailand baht [THB] = 1 United States dollar [USD]), or 0.9% of the national budget and about 0.5% of the agricultural GDP. Of the total investment, on average, the MOAC and the Ministry of University Affairs received 75% and 21%, respectively; all other agencies shared the remaining 4%. Of total spending on agricultural research, about 83% was allocated to crops, 6% to livestock, 5% on fisheries, and 6% on forestry. Of the total allocation available to the MOAC, the Department of Agriculture receives, on average, 51% to support most crops research in Thailand. Over the past 2 years, as the MOAC budget has remained relatively stable, in real terms, the funds available to cover research costs have decreased. In 1984, there were some 7950 agricultural researchers of whom 62% and 31%, respectively, were employed by the MOAC and the Ministry of University Affairs. In an attempt to control administrative costs, the government has limited the growth of staffing to 2% per year.

Present Project Cycle

A research project requiring government funding is treated the same as any other development project following different routes depending on whether or not the target population is in a poverty or nonpoverty area. Nevertheless, the NESDB is required to formulate the 5-year national economic and social development plan. The line ministries translate national policies and priorities as expressed in the 5-year plan into sectoral or ministerial 5-year plans. There are gaps and inconsistencies, however, in the planning process and in the plan itself. More specifically, the following perceptions are commonplace:

- There is a lack of specific guidelines to ensure uniformity of approach and the level of detail and format needed to develop sectoral plans,
- The plan is completed too late to be used by some ministries to formulate their own programs in time for budgeting during the first fiscal year of the national plan, and
- Officials in the ministries and departments do not have the opportunity to participate in the preparation of the national plan.

Whether or not the concerns are valid, the NESDB has attempted to circumvent such problems in the formulation of the PEP component for the Fifth Development Plan (1982–86). As described earlier, representatives from the appropriate ministries, departments, and divisions did participate in the plan formulation, and the process was completed in time for the budgeting exercise during the first year of the plan.

In addition to the 5-year plan, the NESDB also formulates annual plans for the purposes of guiding ministries and the Bureau of Budget. For annual planning to be effective, however, it must include a review of sectoral objectives and priorities in light of current conditions, an evaluation of the relative success of ongoing programs, and an assessment of the priorities among the separate sectoral components based on current information and anticipated financial resources. In reality, because such a systematic process of review and adjustment is lacking, it is difficult to determine the degree to which a ministry's annual budget plan is directed toward achieving the targets of the plan. As such, it is believed that program and project evaluation is probably the most neglected activity in the planning system. Appraisal, monitoring, and evaluation are carried out mainly at the project and rarely at the program level; therefore, the study concentrated on the project planning cycle.

Identification

Project identification has improved during the past 10 years. Before that time, operational agencies customarily submitted project "shopping lists" to the NESDB for inclusion in long-term development plans. Projects were not scrutinized to the extent to which they addressed national priorities, and alternatives were seldom suggested. Once projects were included in the long-term strategy, it became difficult to reject them. However, for the Fifth National Plan, NESDB took a more aggressive role in coordinating project identification functions within the context of the PEP. Representatives from the concerned ministries, departments, and divisions did participate in plan formulation as well as in other stages in the project cycle. Unfortunately, agencies that are active in nonpoverty areas continue to submit lists for approval. Economic and social cost–benefit analyses are conducted rarely, mainly because research managers contend that the necessary expertise is lacking.

Formulation, Appraisal, and Approval

Few agencies have standardized guidelines for project formulation. Furthermore, because returns to agricultural research are usually long term, and assumptions pertaining to projects are believed to be difficult to predict, many managers contend that agricultural research projects need not be prepared in as much detail as, for example, economic development projects. As a result, most proposals do not contain sufficient data and information to make a critical examination.

The shortcomings in the project formulation and appraisal process at the department or ministry level place an extremely heavy burden on the NESDB staff. As a partial remedy, the NESDB has developed and circulated a manual that offers guidelines for projects to be considered in the national plan. Most government agencies, however, complain that too much detail is required. Although some agencies try to follow the NESDB's format, others completely ignore it and revert to their own procedures.

Within the NESDB, planning, appraisal, monitoring, and evaluation are functions of the Projects Division. The normal appraisal methodology is cost–benefit analysis. A project is usually approved if its net benefits exceed those of the next best alternative. In practice, because many proposals from operational ministries are substandard, the usual scrutiny cannot take place. The only consistent exception to this pattern concerns projects that are submitted to international or national funding agencies. Most such proposals are of a superior quality because the donor agencies assist in project development and the requesting agencies are very much aware of the strict requirements of the potential funding source.

Procedures used for externally funded projects and, to a lesser extent, those included under PEP offer some important lessons. Minimal and mutually accepted requirements are known and are strictly applied. Project formulation is inherently linked with project appraisal. The information that is used to develop and justify a project is also used to review and judge the initiative. Appraisal is not treated as a one time event but occurs at several stages in the cycle. The relative value of a project begins at the point of origin. Amendments are made until the project falls within acceptable norms or it is rejected.

Because proposals must compete for the available resources, some selection process becomes mandatory. Recently, competition has become so great that a cabinet-appointed committee, spearheaded by the NRDC, has been charged with the responsibility of selecting public investment projects, particularly those from within PEP. Requesting agencies are given the opportunity to challenge the analysis and the committee's decision. Experience has shown that projects that have been well conceived and documented usually run into fewer difficulties than their counterparts.

Monitoring and Evaluation

Central Government Units

Of all agricultural research projects that have been approved in the Fifth Plan, very few included any ongoing monitoring and evaluation activities. There is considerable and growing interest, however, in the need to ensure that projects are consistent with national priorities.

Eight central agencies monitor and evaluate agricultural research projects. It is commonly believed, however, that coordination among all agencies is relatively weak. The relationships between such institutions and the cabinet are depicted in Fig. 1. The NESDB and the Bureau of Budget are the two key agencies that directly affect the decision-making process. There have been a number of recent developments in the central agencies that should lead to more effective monitoring and evaluation. For example, both the Bureau of Budget and the Controller General are developing new systems to improve the use of budgetary resources. The most outstanding and relevant development has been the introduction of a comprehensive monitoring and evaluation system for the PEP. Together, the NESDB, the Bureau of Budget, and the operating ministries prepare and implement a work plan that includes expected indicators of achievement, reporting schedules, required formats, acceptable operating procedures, etc. Clearly, the NESDB perceives the need to move from rather ad hoc measures to a more systematic monitoring and evaluation process.

Operating Agencies

Monitoring and evaluation activities in the operating ministries usually are the responsibility of the Projects Division in the Office of the Permanent Secretary linked to counterpart projects divisions within most departments. The Sugarcane and Sugar Institute and the Tobacco Monopoly are exceptions because neither has a specific unit charged with monitoring and evaluation functions.

Because the MOAC and the Ministry of University Affairs are the most important agricultural research agencies, the study concentrated on analyzing their monitoring and evaluation systems. The six universities implement research projects independently from the Ministry of University Affairs. The Ministry becomes involved only when a cabinet decision is necessary. Monitoring and evaluation, therefore, are very much left to the individual universities. Within any university, research funds are allocated in a lump sum to various departments through a committee selection procedure. The departments have their own mechanism to allocate additional funds to various projects, again usually through another committee structure. Once sanctioned, monitoring and evaluation become the responsibility of each project manager. In many instances, the value of a research project is judged on whether or not the results are published.

MOAC monitoring and evaluation functions are located under the Office of the Permanent Secretary within the Projects Division or within the Foreign Agricultural Relations Division or both. They each tend to monitor initiatives that involve foreign funding agencies and the projects they support. In addition, although separate from but of equal status to the ministry, is the Office of Agricultural Economics, which is intended to be the focal point of all ministry-level planning. In the Office of Agricultural Economics there is a Plan and Policy Division and within this division exists a Monitoring and Evaluation Section. In reality, most planning is conducted in the ministry departments with little direction or coordination offered by any units charged with ministry-level responsibilities. Most departments within the MOAC have their own projects division, usually with two to four permanent staff responsible for monitoring and evaluation.

Special Programs

In the Fifth Plan, the Eastern Seaboard Development Program and the PEP have elaborate and comprehensive planning, monitoring, and evaluation systems, the former is beyond the scope of this study.

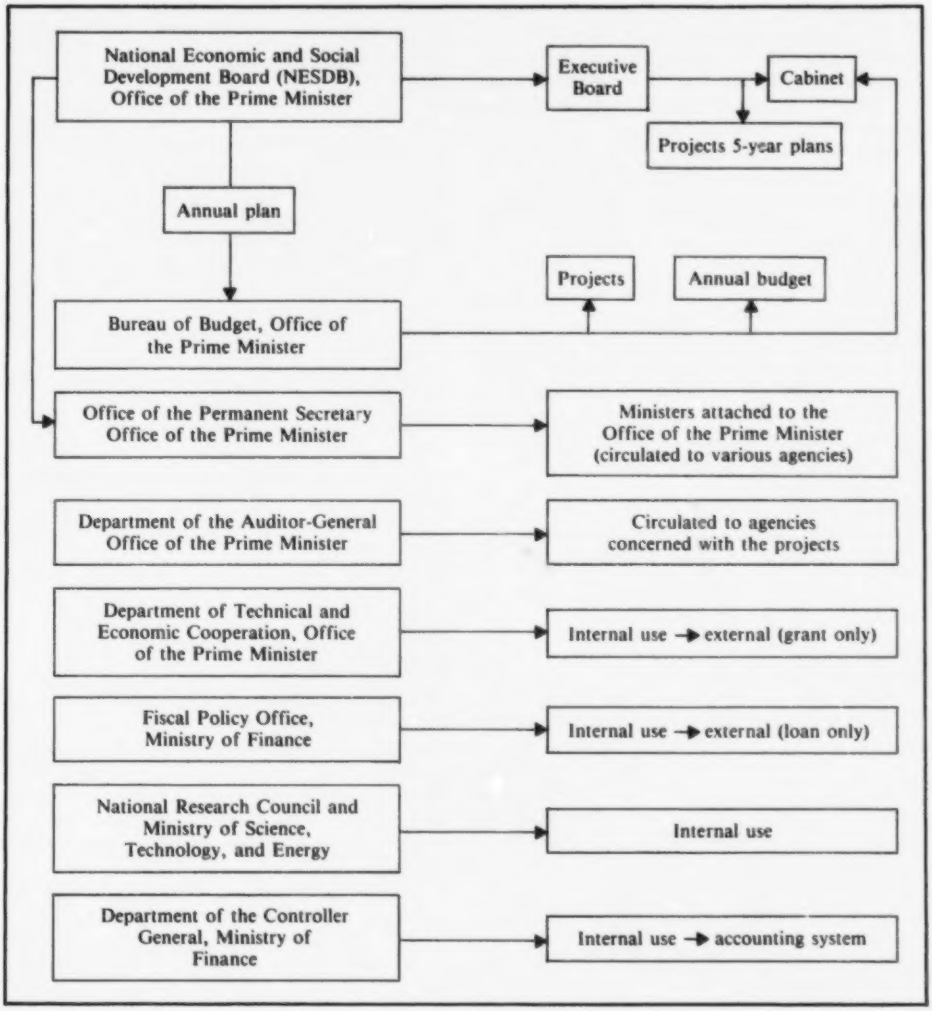
National Economic and Social Development Board (NESDB), Office of the Prime Minister
Executive Board
Cabinet
Projects 5-year plans
Annual plan
Projects
Annual budget
Bureau of Budget, Office of the Prime Minister
Office of the Permanent Secretary Office of the Prime Minister
Ministers attached to the Office of the Prime Minister (circulated to various agencies)
Department of the Auditor-General Office of the Prime Minister
Circulated to agencies concerned with the projects
Department of Technical and Economic Cooperation, Office of the Prime Minister
Internal use → external (grant only)
Fiscal Policy Office, Ministry of Finance
Internal use → external (loan only)
National Research Council and Ministry of Science, Technology, and Energy
Internal use
Department of the Controller General, Ministry of Finance
Internal use → accounting system

Fig. 1. Central monitoring and evaluation units.

Because the PEP, however, includes agricultural research projects, it does offer an example of how various operating ministries and departments can be encouraged to work cooperatively with a central planning agency and how monitoring and evaluation work can be used to improve programing.

In the PEP, projects are approved through a special committee appointed by the NRDC consisting of the NESDB, Bureau of Budget, Civil Service Commission, and project authorities. Progress and achievement are judged by the committee including a review of spending and manpower employed to date; therefore, in a collaborative way, monitoring does occur with the direct involvement of the project managers.

There is no evidence to suggest that formal and systematic monitoring and evaluation procedures exist outside the poverty areas. Approval to conduct evaluation work is based on the interest in each agency. Departments, however, do have various reporting requirements, for example, for budgetary purposes, within 15 days from the end of each quarter, each department must submit progress reports to the respective ministry. If spending on a project is behind schedule, a supplementary report is required. Within the MOAC, project managers must provide a progress report every 15 days and complete a 4-month reporting form designed by the ministry. Many researchers are critical of what they consider to be a significant reporting burden.

Resources Allocated to Monitoring and Evaluation

Manpower and budgetary allocations are determined on past activities and not on a project-by-project basis. Hence, data on resources allocated to any specific agricultural research project are not available, except within those departments whose sole function is agricultural research. Even then, it is incorrect to assume that all activities in the department are research activities. Figures on manpower and financial resources, however, for all agricultural development projects during the period 1981–85 are available and can be used as an approximation of possible resources for monitoring and evaluating agricultural research projects.

During 1982–85, the government invested about USD 320000/year for monitoring and evaluating agricultural development projects (Table 1), all of which was devoted to pay for 1091 person years of work. The allocation is equivalent to 0.02% of the national annual production value of rice.

Judging from the available resources in various institutes, it seems that only the Office of Agricultural Economics and the Department of Agriculture are able to perform monitoring and evaluation to any significant degree. In projects that are supported by external grants, funds are usually available for conducting progress review workshops and seminars. It is believed, however, that the value of such expenditures is not particularly large and should not significantly affect the data presented in Table 1.

Table 1. Estimated manpower and financial resources for monitoring and evaluation of agricultural development projects by institutes and averages during 1981–85.

Institute	Staff (man years)	Total financial resources[a] (1000 THB)[b]
National Economic and Social Development Board (NESDB)	180	65.3
Bureau of Budget	132	400.0
Office of the Permanent Secretary, Office of the Prime Minister	24	30.0
Department of Technical and Economic Cooperation	24	416.2
National Research Council	142	375.0
Fiscal Policy Office	60	35.0
Office of Agricultural Economics	276	5000.0
Department of Agriculture	73	1787.2[c]
Department of Fisheries	96	190.0
Department of Livestock	24	30.0
Land Development Department	60	40.0
Total	1091	8368.7

[a] No institutes obtained loans.

[b] 26 Thailand baht (THB) = 1 United States dollar (USD).

[c] Includes a grant of THB 421.200.

Status of Monitoring and Evaluation Activities

During the study, several "technical progress reports," five cases of monitoring reports, and only one example of evaluation of agricultural research projects were identified. Other than reporting, however, there are several other ways and means by which progress in agricultural research projects is known. For example, the annual Technical Conference of Kasetsart University gives scientists an opportunity to present and discuss research findings. The 15 national research institutes also organize seminars several times each year. Furthermore, all research departments must submit quarterly progress reports to their ministries. It is not certain, however, what each ministry does with the reports and what benefit is achieved. Annual reports from departments and ministries are also required, although they are usually 1–2 years behind schedule.

The Bureau of Budget also monitors project implementation, but the intended user is the Bureau itself. Hence, there is little or no feedback from the monitoring process into national or project planning. The Department of Agriculture has attempted to monitor all of its project and nonproject activities. Results are published annually and include project profiles that list objectives, targets and budgets, achievements, economic viability, impact, problems, and recommendations. To date, problems that have been identified have tended to be bureaucratic in nature (e.g., insufficient manpower, budget, and lack of coordination). Although improvements are possible, the Department's efforts are praiseworthy. As far as is known, it is the only department that has attempted to collect and analyze data on its own activities.

The Department of Technical and Economic Cooperation has also attempted to monitor some foreign-funded projects. Furthermore, project authorities are required to submit progress reports at specific intervals. The impact of such an exercise on project management is uncertain. The National Research Council also monitors projects that receive funding from the Council. Progress must be reported within a given time period before new funds will be released. Although the effect on project management is debatable, the exercise does help to control spending.

Because monitoring within the PEP is carried out by a special body with direct and strong support from the Prime Minister's office, there have been several tangible results. Some ongoing projects have been modified and improved, some unsuccessful projects have been terminated, and the identification and implementation of projects has become a continuous, rigorous, and collaborative process.

In summary, and with few exceptions, no attempt has been made to implement a comprehensive project evaluation system in the Thai government. Project evaluation as part of the overall planning and management process is evident only in the PEP. Even there, the process is still evolving, and only brief assessments have been concluded.

Total Investment Versus Output

Investment in Agricultural Research

During the fiscal year from 1974 to 1983, the Kingdom has steadily increased its investment in agricultural research. Research expenditures have increased from about THB 200 million in 1974 to THB 850 million in 1983. The average research expenditures represent only 0.09% of gross national product (GNP) or 0.6% of agricultural GNP (Table 2).

Research Expenditures/Production Value of Subsectors and Commodities

Of the total agricultural research expenditure, 83.6% was spent on crop research, 5.9% on livestock, 4.6% on fisheries, and 5.9% on forestry (Table 3). On the average, the research expenditures relative to the value of production, which is termed research intensity, were crops 0.37%, livestock 0.16%, fisheries 0.19%, and forestry 0.38%.

In this study, we selected two main crops to study in more detail. The annual rice research budget average between 1974 and 1983 is about 14.7% of the total expenditure (Table 4), whereas corn and sorghum get little financial support, about 3.2% of the total expenditure. Corn and sorghum expenditures cannot be broken down for each commodity, however, the emphasis has been on corn.

Rice consistently received the highest share of crop research expenditure during the 1974–83 period. The amount of expenditure increased from THB 35 million in 1974 to THB 125 million in 1983. Its share in the crop research fund varied from 12 to 18% of the total. Corn and sorghum are grown mainly for export purposes. They combined to account for an average of about 4% of the total annual crop research expenditures during 1974–83.

Research and Productivity

It is helpful to view agricultural research as a production activity having both inputs and output. The principal inputs consist of scientific personnel, laboratory facilities, test plots, libraries, computers, etc. The output is new knowledge. This knowledge comes in several forms and is utilized in a variety of ways. In its most basic form, it can further our understanding of nature and allow us to make technological advances that otherwise would be impossible. Other knowledge comes in more applied forms, such as new, higher yielding varieties of crops, or it may come in forms that can be directly utilized by farmers, such as knowledge about the nutrient requirements of livestock or about cultural practices that increase crop yields. Some of the knowledge is utilized by the farm supply industries in conjunction with that produced by their own research and development (R&D) to create new, more productive inputs for agriculture. In summary, we can say that agricultural research produces new knowledge that in turn creates or makes possible the production of new, more efficient inputs for agriculture.

It is also important to recognize that knowledge is a form of capital. As such, it shares some common characteristics with the more conventional form of capital such as buildings and machines. First, it pays

Table 2. Agricultural research expenditure relative to gross national product (GNP) at current market prices (in million THB).[a]

Items	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
GNP	270052	298597	336374	391016	464550	546449	672440	764379	819760	598884
Agricultural GNP	85033	94063	104657	110929	129094	147076	173806	187856	183742	204443
Research expenditure	202.7	307.0	313.5	384.0	397.7	392.7	555.7	674.6	767.5	850.9
% of GNP	0.07	0.10	0.09	0.09	0.08	0.07	0.08	0.08	0.09	0.14
% of agricultural GNP	0.23	0.42	0.48	0.53	0.50	0.48	0.51	0.59	0.64	0.69

[a] 26 Thailand baht (THB) = 1 United States dollar (USD).

Table 3. Research expenditure relative to value of production (at current market prices) in four agricultural subsectors (in million THB).[a]

Items	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Crop										
Value	63204	69666	77509	79069	96180	107950	130372	138886	139852	149973
Expenditure	174.2	255.2	273.1	337.6	339.5	333.4	448.5	543.0	622.3	680.7
% of value	0.27	0.36	0.35	0.42	0.35	0.30	0.34	0.39	0.44	0.49
% of total	85.9	83.1	87.1	87.9	85.3	84.8	80.7	80.4	81.0	80.0
Livestock										
Value	10314	11473	12354	14409	12724	16860	21717	24727	23608	28840
Expenditure	8.2	13.6	12.5	21.3	22.6	23.7	27.7	56.2	63.9	59.5
% of value	0.07	0.11	0.16	0.15	0.18	0.14	0.11	0.22	0.27	0.24
% of total	4.0	4.4	4.0	5.5	5.6	6.0	4.9	8.3	8.3	7.8
Fisheries										
Value	7545	8454	9792	12456	13086	13017	11984	13153	14150	14466
Expenditure	8.2	13.5	17.7	17.4	19.1	21.5	24.3	30.0	37.1	35.7
% of value	0.10	0.15	0.18	0.13	0.14	0.16	0.20	0.22	0.26	0.36
% of total	4.0	4.3	5.6	4.5	4.8	5.4	4.3	4.4	4.8	4.2
Forestry										
Value	3970	4470	5002	4995	6325	5125	9733	11090	11132	11164
Expenditure	12.1	24.8	10.2	7.7	19.1	14.1	55.2	45.4	44.2	75.0
% of value	0.30	0.55	0.20	0.15	0.30	0.27	0.56	0.40	0.39	0.67
% of total	5.9	8.0	3.2	2.0	4.9	3.5	9.9	6.7	5.7	8.8

[a] 26 Thailand baht (THB) = 1 United States dollar (USD).

Table 4. Agricultural research expenditure on rice and corn compared to their value production at current market prices (in million THB).[a]

Items	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Rice										
Value	28002	28312	25650	30166	37428	39813	45331	49292	44024	48111
Expenditure	34.89	45.47	55.16	59.6	61.60	63.54	71.25	83.87	88.17	124.55
% of value	0.12	0.16	0.22	0.20	0.16	0.16	0.16	0.17	0.20	0.26
% of crop research expenditure	17.2	14.8	17.5	15.3	15.4	16.1	12.8	12.4	11.4	14.6
Corn										
Value	5672	5981	4812	2310	4571	6350	7509	7900	5381	6819
Expenditure	8.16	10.81	11.85	12.82	14.50	19.01	13.38	16.84	14.96	n.a.[b]
% of value	0.14	0.17	0.25	0.55	0.32	0.30	0.18	0.21	0.28	—
% of crop research expenditure	4.0	3.3	3.7	3.3	3.6	4.8	2.4	2.5	2.0	—

[a] 26 Thailand baht (THB) = 1 United States dollar (USD).

[b] n.a. = not available.

off over a long period of time. For example, current generations are still benefiting from early advances in mechanization, genetics, and plant physiology. Second, the production of knowledge in most cases is characterized by a substantial gestation period. The existence of the gestation period, or lag, together with the long payoff period, requires that we accumulate costs and discount returns in evaluating the profitability of research.

Agricultural Research Goals

Improved productivity in agriculture has always been an important source of economic growth. Growth in farm productivity is a result of many forces, although the evidence is sufficiently clear to attribute a good part of that growth to investment in research. Investment in research has been an important factor in improving farm productivity, and this is a major source of growth in real incomes. If this is taken as the goal of research then it is a relatively simple matter to look at the costs and benefits. But the costs and the returns occur at different times. Investments in research today generate results and contributions to output at various times in the future.

Method of Measurement

To evaluate the attractiveness of research as an investment we must have a measure of both its costs and its returns. Cost figures, at least for public expenditures, are available and, therefore, have not been a major problem. Measuring the value of knowledge is another matter. It does not come in a unit that is easy to measure. Thus, we have to use indirect measures of its value.

The method that has been used to measure the monetary returns to agricultural research is the index number approach. A productivity index is used to measure the impact of research on productivity. This index is yield per unit area. The monetary value of the increase in productivity has been obtained by measuring the value of additional output obtained from a given level of conventional inputs. The value of this additional output resulting from the increase in productivity sometimes is referred to as "consumer surplus," reflecting the idea that the ultimate beneficiaries of agricultural research are consumers. All the costs and returns are computed in terms of present values.

Benefit–Cost Analysis

Lists of agricultural research projects were first obtained from various government agencies. Agricultural research is conducted mainly by public institutions, because there are no private or international research organizations carrying out biological research programs in agriculture. Private commercial companies and bilateral and international organizations have provided financial support to the public research institutions. Agricultural research, however, is considered as a service provided by the public sector to the agricultural sector. Research expenditure and value of total agricultural output is presented in Table 5.

The benefit–cost (B/C) ratio was computed for the total investment in agricultural research. From these results, the investment in agricultural research generates a return of about THB 20 for every baht invested and is not influenced significantly by selecting a 5, 10, or 15% discount rate. In this study, the value of the baht (present value of total benefits) was calculated assuming that the research produces benefits that reach full adoption over a 5-year period and last for 30 years. The present value of the benefits was estimated for three different levels of the discount rate. The benefits vary little depending on the discount rate used.

Case Studies: Rice and Corn

In terms of the entire country, total production of rice has increased to about 89% in 1983 compared to 1968 production. This is not because the area planted was increased, because this has only risen about 38% in 1983 compared to the base year of 1968. The rice yield has also increased about 36% in 1983 compared to 1968 (Table 6). Total production of corn increased about 167% in 1983 compared to 1968 production. This rise in production, however, can be attributed to the increase of planted area and the yield per unit area of corn. The latter contribution may be a result of the benefits achieved from research

Table 5. Value of total agricultural output and research expenditure in Thailand, 1969–83 (in million THB).[a]

	Total agricultural output	Research expenditure
1969	47571.1	229.3
1970	43423.4	281.9
1971	45719.8	285.2
1972	53756.5	247.9
1973	78762.1	226.9
1974	94167.3	202.7
1975	104950.6	307.0
1976	115447.3	313.5
1977	127148.3	384.0
1978	135191.3	397.9
1979	153342.4	392.7
1980	187572.2	555.7
1981	192288.2	674.6
1982	192376.6	767.5
1983	191119.1	850.9

[a] 26 Thailand baht (THB) = 1 United States dollar (USD).

work. The area planted has increased about 122% in 1983 from 1968. Also, during the same period, the yield per unit area has increased about 21%. The contribution of research investment, therefore, may be in the form of increased yields per unit area as is the case with both crops.

Table 6 presents the B/C ratio of rice and corn based on the area planted and harvested at different discount rates. Both returns and research expenditure have been discounted at three different discount rates: 5, 10, and 15%. When considering area planted returns from agricultural research, investment on the average is about THB 50/THB invested for rice and THB 8 for corn. When area harvested is used, the returns are about THB 45/THB invested for rice and THB 12 for corn. It should be noted that cost used in this case study only refers to research operating expenses allocated directly to the rice and corn project. Some cost items are joint costs that are incurred in more than one crop. It is difficult to separate such costs for each particular crop, so these were not included in this study.

As the discount rate increases, the returns per THB invested in agricultural research are getting smaller for rice and larger for corn. If one defines the opportunity cost as the rate of return to other types of agricultural investment, or to conventional development projects such as road building, education, etc., for which 15% is the assumed rate, then the discount rate that equalizes benefits and costs of the project over its duration in the case of rice will be greater than the opportunity cost, and in the case of corn, it will be smaller than the opportunity cost. In our example, therefore, we can say that it is profitable to increase the stock of knowledge by investing more in rice research as long as the internal rate of return is greater than the opportunity cost of capital. This is not the case, however, for corn at the same opportunity cost.

The value of the B/C ratio obtained in this study is useful to policymakers in determining the proper level of research expenditure. To maximize the contribution of research to the established development goals, available resources must be judiciously allocated among different activities. A meaningful and efficient allocation of research resources, however, should go through two stages as suggested by Ruttan (1982).[1] One is an initial preordering of research programs based on some judgment of the potential value of the research. The second involves the selection of individual research projects that can contribute to the success of the program most effectively. This second stage may involve the use of a formal B/C approach.

Discussion and Conclusions

Administrators, project managers, and evaluators who are involved in agricultural research projects agree on the need to have a systematic and effective monitoring and evaluating system as part of the overall economic management process. The demand is even more urgent given the various economic difficulties facing the nation. It has been clearly demonstrated that the return to investment in agricultural research is positive. Benefit–cost ratios have been calculated and show conclusively that, under a variety of assumptions, research investment in Thai agriculture is still profitable and more investment should be encouraged — especially for rice. At the moment, however, agricultural researchers do not have data or information on the current planting areas of the new varieties that they have generated and released. With such a deficiency, it is difficult to convince policymakers of the potential benefits from agricultural research.

For the monitoring and evaluation system to function in an overall economic management process, it must be compatible with the social, economic, political, and cultural setting of Thailand. There is no guarantee that imported systems will function properly. Hence, with few local examples to follow, the PEP has several features that might be replicated:

- High-level commitment to monitoring and evaluation is essential. Clearly, the Prime Minister has emphasized poverty eradication because he chairs the national committee to put the policy into operation. The Prime Minister's commitment has created an "evaluation spirit." For agricultural research initiatives, a strong endorsement by the head of each agency, i.e., the minister, should create the neces-

Table 6. Benefit–cost ratio from agricultural research investment in rice and corn based on area planted and harvested at three discount rates (r).

	Area planted			Area harvested		
Crop	r = 5%	r = 10%	r = 15%	r = 5%	r = 10%	r = 15%
Rice	56.62	52.84	49.49	52.32	44.82	42.03
Corn/sorghum	7.80	8.19	8.68	11.83	12.97	14.17

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[1] Ruttan, V. 1982. Agricultural research policy. University of Minnesota Press, Minneapolis, MN, USA. Pp. 262–297.

sary motivation to assess projects and programs thoroughly.

- Project managers should be held responsible not only for the delivery of services and outputs but also for the achievement of objectives. Managers must be persuaded that it is effects not outputs that count.
- In the PEP, the monitoring and evaluation unit is closely linked to the decision-makers. A monitoring and evaluation unit must be within and not outside the management structure.
- All concerned agencies in the PEP are drawn together to participate in the same venture. As such, it ensures that the unit is responsive to the problems of the project or policy execution and that any information generated is used. In so doing, the system also helps to overcome any antagonism that may occur between evaluators and project managers. Both parties have a sound knowledge of the other's activities and problems and are sensitive to the constraints under which each one operates.
- Monitoring and evaluation procedures for projects in the PEP are designed at initiation. Clear, specific, and verifiable indicators of achievement are known to all.
- The monitoring and evaluation system in the PEP is based on the principles that the system is an integral part of management tasks, that the active participation of operational staff is necessary, and that the staff who operate projects should not be responsible for evaluation duties. As such, a mixture of impartial outside investigation is coupled with in-house monitoring and evaluation.

From the current study, several other issues have been reported and should be considered when introducing a systematic monitoring and evaluation system for agricultural research:

- With limited financial and human resources available for monitoring and evaluation, it might be necessary to limit any comprehensive analysis to several key projects. With the experiences gained, a decision can be made on the manner and extent of future coverage.
- Economic (specifically, cost–benefit) analysis has always been the technique used to judge projects — even in the PEP. The results of such a method, however, do not constitute a final decision. Whatever technique is used, policymakers must be informed of the potential impact of a project on the sector and the economy.
- Existing monitoring and evaluation reporting needs to be simplified and standardized — preferably constructed around the existing system.
- Detailed field surveys are expensive and time consuming. The PEP resorts to establishing a permanent national network that encourages participation from the local administration. Such a practice should minimize the need for ad hoc surveys. Additional data would be required only for individual case studies or if observations on specific development issues were needed.

There is a general awareness of the need for an effective monitoring and evaluation system for agricultural research in Thailand. In fact, many government agencies are performing some form of monitoring and evaluation, albeit under a variety of objectives.

In agricultural research, however, monitoring and evaluation has not gained recognition for its potential role in the economic development process and, as such, little support and expertise are available. A system must be developed that links the central and operational agencies. Numerous institutional and methodological aspects require careful attention. In the short term, the experiences gained through the PEP can be replicated to cover nonpoverty development projects. In conclusion, overall research investment in Thai agriculture is still profitable, and more investment should be encouraged in this sector. Two crops, rice and corn, indicate the favourable situation and warrant further investment, especially for rice.

Role of Evaluation

Evaluation of Agricultural Research in Colombia

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Based principally on secondary sources of information and interviews, an analysis is made of the evaluation of agricultural research in the Instituto Colombiano Agropecuario (ICA) (Colombian Agricultural and Livestock Institute). To unify the management and analysis of information, some concepts and definitions used in the process of evaluation and its application are described. To facilitate the interpretation of research evaluation in the ICA as a factor of time and structural organization, a detailed description of the organization is given beginning in 1955 to the latest restructuring of ICA in 1984.

Evaluation of research in the ICA is discussed in the context of the national, sectoral, and institutional planning process, especially referring to evaluation when information permits. The validity of evaluation as an internal stage in the planning process in ICA has been closely linked to the institutionalization of planning in Colombia in 1958.

Although the evaluation function is explicit in the statutes and decrees of the institute, and much valuable work has been done on the subject, the degree of fulfillment is generally low for all areas with very few exceptions. The need to implement, apply, and institutionalize the planning execution process, however, especially at the evaluation stage, is shared by all decision-making levels in the ICA.

This report describes and analyzes the function of evaluation of agricultural research in the Instituto Colombiano Agropecuario (ICA) (Colombian Agricultural and Livestock Institute) and formulates recommendations to strengthen and institutionalize evaluation in the organization. The analysis covers concepts and definitions; classifications and typification of secondary information on evaluation; method and techniques employed; historical evolution of the ICA institutional model; national, sectoral, and institutional planning in Colombia; and the historic evolution of evaluation in the ICA.

The analysis of the evaluation function in the ICA is based principally on secondary sources of information, interviews with executive personnel at different levels and with researchers, as well as the author's experience of 17 years in the ICA as researcher, national program director, research director, planning director, and, later, planning consultant. The criticisms, suggestions, and recommendations made by executives who read the methodological documents written at the end of 1984 and the first semester of 1985 were also taken into account. Also, to unify the management and analysis of information, some concepts and definitions used in the process of evaluation and the application of its techniques are given in the following.

Concepts and Definitions

In essence, evaluation measures, compares, and analyzes the coherence between results and specific objectives and between specific objectives and general objectives of institutional projects, programs, or plans. It also determines whether or not the general objective is being reached as well as its expected impact. According to the period covered, evaluation may be ex ante, progress evaluation, or ex post:

(a) *Ex ante evaluation* analyzes the internal and external consistency of plans, programs, and projects before they are carried out.

(b) *Progress evaluation,* with relation to what has been programed, measures the degree of use of resources and materials, the execution of activities, and the partial results reached.

(c) *Ex post evaluation,* according to its objectives, may be ex post evaluation of *results* or ex post evaluation of *impact.*

The types of evaluation and their techniques are grouped as follows:

(a) *Economic impact* measures the impact through cost–benefit relations and the internal rate of return.

(b) *Impact.* Effects attributable to the achievement of general objectives of plans, programs, and projects measured qualitatively or quantitatively by changes in variables such as production, productivity, income, costs, employment, nutrition, and product quality.

(c) *Basic.* Diagnosis and analysis of socioeconomic, biological, physical, technical, and institutional reality that will hopefully be improved through research activities.

(d) *Analytic.* Socioeconomic analysis of the limitations to change of activities and projects under way: adoption studies, productivity analysis, risk, use of labour, marketing credit, and prices and their effects on technological alternatives.

(e) *Operative.* Comparative analysis between materials and resources used, activities carried out, and results achieved — measures of efficiency.

(f) *Of Results.* Economic analysis of research results, retribution factors, and adoption probabilities. Comparative analysis of results and specific objectives obtained with respect to those programed.

(g) *Traditional.* Uses traditional mechanisms and instruments for evaluation, such as reports, technical meetings, committees, and ad hoc groups for special purposes, courses, and seminars.

(h) *Personnel.* Performance evaluation of professional, administrative, and technical personnel.

Classification

There were 206 documents consulted for the 1962–86 period. ICA accounts for roughly 75% and the rest comes from 18 different agencies related to research activity in Colombia. Table 1 indicates the distribution of the evaluation studies by 4-year periods. A noticeable concentration is apparent in the post 1974 period.

With respect to the type of evaluations, the methodologies cover 26.7% of the documents consulted. Analytic evaluations, diagnoses or base evaluations, and evaluation of results follow in order of importance. Impact evaluation and economic impact evaluation jointly make up 11% of the documents. It is very probable that the information as to traditional evaluation is overestimated, as is the frequency of base evaluations. From the Department of Agricultural Research (DAR) to 1974 in ICA, progress reports by program, experimental centres and stations, and regional managers were frequent, but they gradually began to disappear by the date noted. Area diagnoses and specific-problem diagnoses have been numerous, but, unfortunately, there is no detailed inventory. This lack is covered, however, by the information on different types of evaluation (Table 2).

Institutional Model

To facilitate the interpretation of research evaluation in the ICA, as a factor of time, an analysis was made of the evolution of research activity organization as part of the overall structure of the Institute, beginning with the DAR from 1955 to 1962 to the latest restructuring of ICA in May 1984 (Fig. 1). In the years between 1879 and 1915, some efforts were made in Colombia to create the capacity for agricultural research. Its institutionalization, however, began with the creation of the DAR (1955–62) as a department of the Ministry of Agriculture with the specific function of carrying out research in eight products and seven support disciplines, which operated as national programs.

Table 1. Number of documents consulted on evaluation of agricultural research, 1962–86.[a]

Period[b]	Number	Percentage
1962–65	—	—
1966–69	1	0.5
1970–73	20	10.6
1974–77	58	30.9
1978–82[c]	49	26.1
1983–86	60	31.9
Total	188	100.0

[a] Does not include 18 undated documents.

[b] The intervals roughly coincide with presidential periods.

[c] Data presented for a 5-year period.

Table 2. Bibliography consulted by type of evaluation, 1962–86.[a]

Type of evaluation	Times cited	
Economic impact	12	(5.8)[b]
Impact	11	(5.3)
Base	26	(12.6)
Analytic	32	(15.5)
Operative	3	(1.5)
Results	21	(10.3)
Personnel	7	(3.4)
Traditional	12	(5.8)
Methodologies	55	(26.7)
Others	27	(13.1)
Total	206	(100.0)

[a] Normative or descriptive documents but with reference to the function of evaluation.

[b] Figures within parentheses are percentages.

From the creation of the ICA in 1963 to the present, the Institute has had four reorganizations. The initial model integrated the activities of research, education, and extension. The Research Division was made up of the departments of agronomy, animal sciences, agricultural economics, social sciences, and agricultural engineering, and these included the national programs. The activities of planning and administration were kept as support and consulting units. In comparison with the DAR, the hierarchy at the national level added a department, and the stations and centres are maintained at the national level. Although activities, thematic areas, and regional coverage are widened, research activity is the essential function.

In 1968, extensive modifications took place in the agricultural sector. The Ministry of Agriculture maintained its basic functions of direction, policy formulation, programing, and evaluation. The ICA became administratively and financially decentralized. As divisions of the assistant manager for technical affairs, the activities of research, education, and extension were maintained. The activity of rural development and the functions of supervision and control of materials, promotion, seed certification, and super-

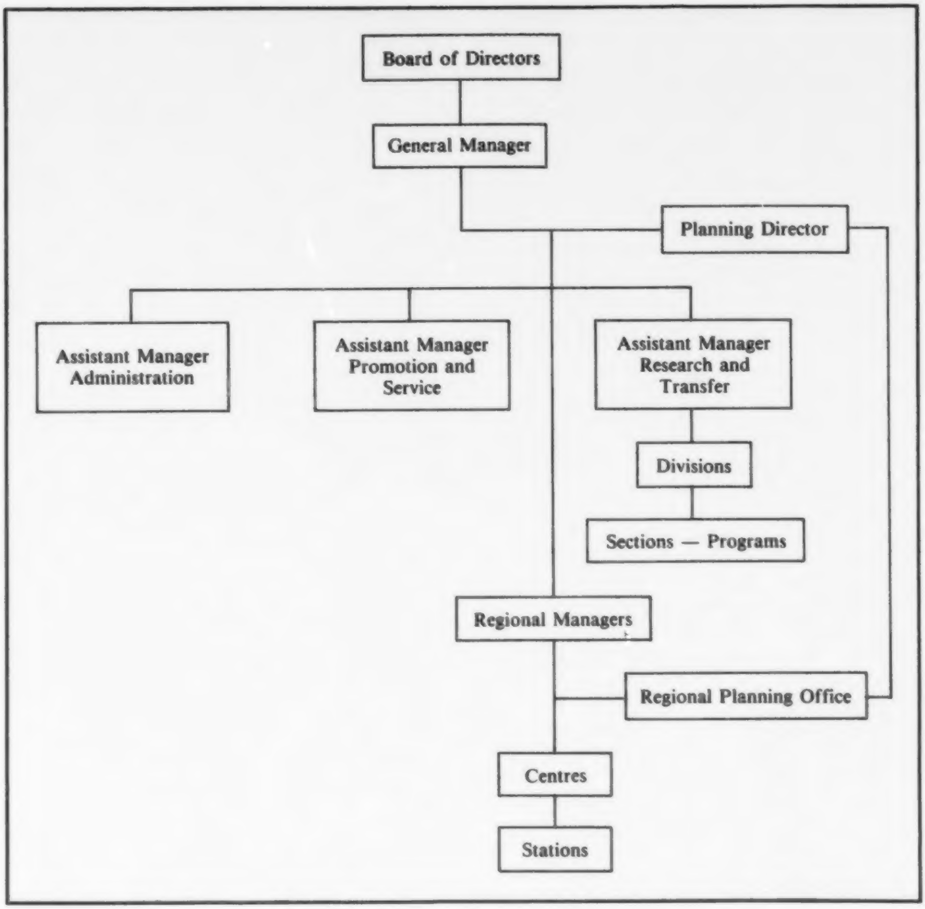
Board of Directors
General Manager
Planning Director
Assistant Manager Administration
Assistant Manager Promotion and Service
Assistant Manager Research and Transfer
Divisions
Sections — Programs
Regional Managers
Regional Planning Office
Centres
Stations

Fig. 1. Organizational structure of the Instituto Colombiano Agropecuario (ICA), 1984.

vision of technical assistance were added. The ICA received equipment and personnel from the Institute for the Promotion of Cotton, the Institute for the Promotion of Tobacco, and the Zooprophylactic Institute. In the Research Division, the Department of Social Sciences disappears and the national programs for cotton and tobacco are added. Operative activities are promoted to the level of assistant manager, as a line unit from the general management. The Institute is decentralized into nine regional offices, and the centres and stations are maintained. With the creation of the assistant managers and regional managers, one level of decision is added at both the national and the regional levels.

In 1973, the position of assistant manager for technical affairs disappeared, but the activities of agricultural and livestock production were added at the level of assistant managers. Research activity was also promoted to the level of assistant manager made up by the divisions of agricultural research, livestock research, agricultural economics, rural sociology, and education. At the regional level, regional directorships were created for each assistant manager at the national level.

In the 1981 restructuring activities, the activities in the areas of social sciences and agricultural economics that belonged to the assistant manager for research passed to the assistant manager for rural development and the divisions are more clearly specified. In 1984, the functions of the assistant managers for agricultural production, livestock production, and rural development are grouped under the assistant manager for promotion and services. The activity of transfer is integrated into the research activity of the assistant manager for research and agricultural transfer. Now, the assistant manager for research has 9 divisions and 42 national programs (sections–programs in Fig. 1), in addition to the Coordinating Office for ICA and the International Bank for Reconstruction and Development (IBRD).

Planning in Colombia

Evaluation as a stage in the planning process is intimately linked to the institutionalization of the process in Colombia, which began in 1958, with the creation of the National Council for Economic Policy and Planning, and the Administrative Department of Planning and Services. In the same year, a mandate was given to organize planning offices in the agencies in charge of preparing partial investment plans, studying the order and routine of public investments, and reviewing and coordinating the projects of the agencies themselves. With the 1968 restructuring, the offices for economic policy and planning already mentioned were named the National Council for Social and Economic Policy (NCSEP) and the National Planning Department (NPD). In 1969, planning offices were created in all decentralized institutes.

By decree, NCSEP must study and make recommendations to the government and the development plans and programs presented by the NPD are to be submitted to Congress. For its part, the NPD must develop the norms for presentation and preparation of plans, programs, and projects that must be followed by the planning offices in the ministries, administrative departments, and other public agencies; assist those offices; develop and coordinate general development plans and projects, as well as *evaluate the results and implementation of those plans and projects,* proposing appropriate adjustments and modifications; and *evaluate the plans and programs* presented by the ministries, administrative departments, and other decentralized agencies.

In the NPD, the Technical Unit for Industrial and Agricultural Studies prepares the basic studies for the formulation of plans, programs, and policies for industry and agriculture, in close cooperation with the ministries of development and agriculture. It also must cooperate with public agencies in the evaluation of national and foreign private investment projects that require government intervention. Again according to decree, the evaluation of specific projects and requests for foreign loans must be undertaken by the Unit for Specific Projects and Foreign Credit.

The Division of Agricultural Production, created in the 1974 reorganization has, among other functions, the role of *evaluating the development of public and private activity in the area of agricultural production,* in agreement with existing policies, to determine its effectiveness and to propose necessary adjustments. It also studies and *evaluates the production programs* proposed by the Ministry of Agriculture and studies their inclusion, if that be the case, into the investment budget for the agencies of the sector.

In 1982, the Normative Planning Law was passed. It defines the norms for diverse economic and social efforts in the formulation of development plans, and the procedures used to elaborate the national economic and social development plan. Planning in the ICA was institutionalized in 1969. The Planning Office, however, is not the only unit in the ICA responsible for planning. The various units undertake planning that is specifically related to their work area. For institutional evaluation, responsibilities are dispersed throughout the different units in the ICA (Table 3).

Planning Process

National Level

The process of national planning began with the measurement and evaluation of the implementation and results of public and private investment programs. With this information, policies and criteria for the elaboration of plans and programs are reformulated. Next follows the coordination stage, promotion, and instrumentation of direct planning of the public sector, through which government policies and the scope of its objectives are made operational, using sources of financing as an instrument.

The plans of the private sector, together with those of public investment, including public and private spending, once executed, lead to the reinitiation of the measurement and evaluation of implementation and results once again. The ICA participates in the national planning process, making its own part of the national planning system.

Sectoral and Institutional Level

For its presentation to Congress, the NCSEP recommends policies, plans, and programs for social development and the amount of public investment to the government, all of which has previously been defined and evaluated by the NPD. The Ministry of Agriculture, through its Planning Office for the Agricultural Sector (POAS), internalizes the national policies and, in close collaboration with the NPD, determines the sectoral policies, coordinates and *evaluates the execution of specific programs and projects* for the sector, proposing the necessary readjustments. *The evaluation of the results of implementation* of plans and programs for sectoral devel-

Table 3. Object or goal of evaluation for the Instituto Colombiano Agropecuario (ICA) according to statutes and decree 1114, May 1984.

Area	Object or goal of evaluation
Manager's Advisory Committee	Policies, plans, and programs for achievement of objectives
Planning Office	Scope of activities in the agricultural sector (impact of projects and foreign loan activities)
Office of Education and Training	Training programs
Secretary General	Methods and systems for rationalizing work and improving efficiency of the Institute
Office for Organization and Operational Control	Programs and objectives proposed for administration
Assistant Manager for Agricultural Transfer	Technological limitations and production factors by species and ecological zones, research projects, and activities of respective areas
Coordinating Office for ICA/International Bank for Reconstruction and Development (IBRD) project	Calendars for physical and financial investment, personnel hiring and training, contacts with consultants, and technical and financial development of the project
Divisions	Plans and programs for each division and in depth for some divisions
Technical Support Division	Socioeconomic component of research projects and their results, and economic impact of activities of the area of respective assistant manager, analyzing results and effects on national, regional, and local agricultural development
Livestock Disciplines Division	Production and health limitation by species and ecological area
Centres and Stations Division	Commercial demonstration projects
Assistant Manager for Promotion and Services	Activities, programs, and projects corresponding to the area
Coordinating Office for ICA/United States Department of Agriculture (USDA) program	Activities and technical and administrative results of the program
Divisions	Plans and programs of each division, in depth for some divisions
Division of Agricultural Materials and Resources	Programs of the National Laboratory for Agricultural Materials and Resources
Department of Vegetable Sanitation	Programs in the diagnostic centres and centres for insect and micro-organisms reproduction; vegetable sanitation agreements
Division for Peasant Development	Programing, information, and evaluation system for different peasant development programs (orients design)
Dissemination Division	Communication activities
Assistant Manager for Administration	Techniques and procedures for financial administration and control and finance
Divisions	Plans and programs of each division, in depth for some divisions
Personnel Division	Personnel performance
Division of Commercial Production	Commercial demonstration projects

opment and the proposal of necessary adjustments and modifications is the responsibility of the NPD.

The Director of the ICA with the support of the Planning Office, internalizes the sectoral policies, determines measures, assigns responsibilities and establishes objectives and strategies with other areas of the Institute, and carries out specific activities. The Planning Office is responsible for the activities of national diagnosis and planning. With other areas of the Institute, it develops institutional plans, the 4-year investment plan, and the annual budget project. It coordinates the executing of planning activities with ICA's technical areas and with the offices in charge of the planning process in other public and private agencies. It designs methods for the definition of priorities, follow-up and evaluation of plans and programs, and the coordination of their applications; *evaluates the impact of the Institute's activities in the sector;* and coordinates the programing and evaluation of projects resulting from loans, agreements, and contracts for technical assistance.

In practice, the process operates fundamentally as a mechanism for assigning resources, in large part because of the absence of long-term national and sectoral plans, whose discussion and approval was not defined by the Planning Law. This situation makes it difficult to identify and define the goals of the government in a framework of political consensus. As a result, it is difficult for the ICA to identify long-term objectives, which are part of the activities of research. In the short term, government priorities are frequently changed, making it difficult to assign and organize resources. Beyond the stage of annual budget making and the formulation of the 4-year investment plan, the other planning stages are not uniformly carried out in a methodical and systematic way. Under these conditions, the management of the planning-implementation process becomes difficult, affecting the Institute's efficiency and effectiveness.

Evolution of Evaluation

Given the difficulties of analyzing evaluation separately from the other stages of the planning process, the historical evolution of the entire process will be discussed, specifically referring to evaluation when the information permits. Secondary information will be used from three basic studies done in the ICA (Isaza et al. 1979; ICA 1980; Alarcón 1984), in addition to the documentation analyzed.

To 1978

The organization of the consulting structure for programing and evaluation is considered weak. The lack of a planning system adds to slowness in the flow of information; difficulty in promoting, monitoring, and evaluating local activities; centralization in planning and direction; decentralization in technical activities, with little delegation for coordination and evaluation at the level of implementation; lack of an institutional plan; and an excessive number of functions, which makes the evaluation of the achievement of objectives difficult. On those occasions when evaluation and control of technical activities does take place, it is done by those who carry out the activities; administrative control is done on finished activities.

On considering the degree to which the Planning Office carries out its functions, the evaluation of institutional impact was considered low, the design and application of follow-up and evaluation systems was fair to poor, and the coordination and evaluation of the programing and execution of projects financed with foreign funds was satisfactory. The degree of achievement of its other functions was considered to be from medium to high. The possible causes of the poor grades received by the Planning Office were the complexity of the tasks assigned; low budget; inefficient flow of information and its systematization, fractioning, and possible duplication of planning activities in other offices; and, finally, the frequent changes in the organization of the Office.

The degree to which evaluation functions are carried out — those corresponding to the office of the assistant manager for research — (Table 3) was graded as low for the divisions of agronomy, agricultural engineering and biometrics, discipline director's offices, coordinators, and other research professionals, and medium for the crop coordinators. In the office of the assistant manager for livestock production, the degree to which the Planning Office carried out its duties was considered to be high; medium to high was the grade assigned by the Division of Socioeconomic Studies.

Of the 148 ICA publications evaluated, 58% of them were written during this period, as were 100% of those on economic impact and operative evaluation, and 79.3% of those on analytic evaluation (Table 4). Ten of the eleven evaluations of economic impact, and most of those of analytic evaluation, were MS thesis papers from the graduate school, directed by professionals from the Agricultural Economy Department. Beginning in 1974, ICA's budgetary problems increased, which motivated the preparation of the documents on operative and impact evaluation.

To 1980

The limitations and problems mentioned in the previous period continue. The interpretation of sectoral policies, objectives, goals, and strategies is not carried out coherently and systematically. This activity is made more difficult by the lack of concrete national policies relative to the ICA's activities in the agricultural sector. As instruments for interpretation, meetings and special studies are used.

The determination of the real demand for alternative technologies and services is done without any systematic unifying of criteria by meetings with farmers, mass media, individual requests by farmers or their associations, and, in many cases, simply as a result of the researchers' decisions. Some base studies, however, are made at the local and regional levels and evaluate the situation of farmers in specific areas or of producers of specific crops.

The evaluation of the technical, economic, and social reality, as well as the analysis of the institutional model, takes place sporadically as a result of circumstance and with no global framework. It is necessary to point out that the activities carried out in this area have been numerous and involve specific procedures and methodologies.

The 4-year investment plan is maintained as an orientation mechanism for the medium term. As for short-term orientation mechanisms, the Research Divisions and the DRI districts prepared documents that are somewhat similar to year-long working plans because they point out activities to be concluded. The budget manual is still used, and this program includes yearly and future budgeting activities. The information obtained from this instrument is difficult to manage.

ICA's follow-up and evaluation mechanisms refer mainly to the yearly progress reports and to other types of reports whose periodicity and coverage has been quite variable, although they are complemented by meetings, visits, and special reports of results. This type of evaluation simply consists of a list of activities implemented and their operative problems, with little reference to what was initially programed and the expected impact. When significant results are obtained, their possible effects on the country's development are estimated. Ex ante evaluation of research activities has been a permanent activity of the Project Review Committee.

Aggregate evaluation of the ICA's activities has been quite irregular. The Planning Office, for 2 years in a row, determined the degree to which proposed goals were met, diagnosed the main problems, and, in some cases, described the causes for the differences between what was planned and what was implemented. The ex ante evaluation of the ICA–IDB project was carried out at this time, as well as sporadic ex post evaluation. These activities gradually disappeared, mainly because of a lack of human resources.

To 1984

To date, the guidance of the planning process is still considered difficult, primarily because of the magnitude and heterogeneity of the functions of the government. This difficulty is accentuated in follow-up and evaluation activities. This year, the critical institutional levels for the stages and activities of planning were evaluated. The main empty spots in the steps of this process were, in order of importance, follow-up and evaluation, instrumentation of execution, and a lower degree of programing. Out of a total of 12 activities, it was considered that the following should be reinforced: (a) definition of a guiding institutional framework; (b) evaluation of the institution, policy, and implementation procedures review; (c) proposals for corrective measures; (d) information collection and analysis for follow-up activities; and (e) measurement of achievement and impact. If the follow-up and evaluation stage is considered separately, the weakest activities were institutional evaluation and institutional policy evaluation and review.

If these results are compared with those obtained in studies done in 1979 and 1981, the behaviour of planning activities, and especially of the function of evaluation, can be considered the same. Two very important goals in this period were the formulation of the National Plan for Agricultural Research (NPAR) and the base studies for the formulation

Table 4. Number of documents about the function of evaluation written at the Instituto Colombiano Agropecuario from 1966 to 1986.[a]

Evaluation	1966–78	1979–80	1981–83	1984–86	Total
Economic impact	11	—	—	—	11
Impact	8	—	1	—	9
Base	10	2	5	9	26
Analytic	23	1	5	—	29
Operative	3	—	—	—	3
Results	8	2	10	—	20
Personnel	2	—	1	1	4
Traditional	3	2	—	6	11
Methodologies	19	3	—	13	35
Total	87	10	22	29	148

[a] Does not include four undated methodology documents and two normative documents.

of the National Plan for Agricultural Transfer (NPAT).

To March 1986

In the first semester of 1984, the ICA–IBRD project was approved on the conviction that it would strengthen research activities in priority crops and experimental centres. As part of the component of technical cooperation, the evaluation function, considered critical by ICA, would also be strengthened. Before treating the evaluation function separately, it was considered convenient to analyze planning as a whole, given the relations and interactions of the different stages of the process, and their interrelations with exogenous variables. As a strategy for action, the elaboration of a series of methodological and conceptual documents was agreed upon, which as a first approximation to the study, and as working documents, would analyze and systemize ICA's experience (Table 4). Before beginning the study, the objectives and scope were presented at a meeting of the committee with the office of the assistant manager for research, made up of the division directors.

Once elaborated, the instruments would be discussed in a technical meeting, in addition to the individual or group analysis that would be made of each particular document. The recommendations and adjustments resulting from the evaluations would be used in the development of the final instruments, which would form the planning system. As an intermediate step, the instruments would be applied and evaluated in one or two regions (horizontal instrumentation) and in one or two divisions (vertical implementation). The final stage would be the implementation of the system in the entire Institute. The participating directors implemented the system up to the document analysis stage. For the period, a synthesis of the concept of the system and each of the instruments developed will be made and suggestions and recommendations will be given.

General Problem

Globally, horizontal and vertical disarticulation exists between the planning and the execution of activities and, therefore, among planners, administrators, and executive personnel at the national, regional, and local levels. The disarticulation is made more serious by a strong tendency to strengthen the central office at the expense of other areas of the Institute, because centralized and unidirectional decisions — from the top down — are made, and there is little or no participation by the Institute's target population. The plans and programs developed are somewhat isolated from political, social, and economic reality. Finally, to modernize fiscal control and the administration of resources, too much emphasis is placed on the use of financial techniques.

Proposal

To counteract the problem and that of previous periods, a planning-execution process is conceived as a sole, continuous process, made up of the stages of *formulation, implementation, execution of activities,* and *control evaluation* in which the local level is integrated with the regional level, and the regional level with the national level. This propitiates the real participation of farmers, change agents, the scientific community, and policymakers.

The Institute is an open system made up of three subsystems: (a) the *production* system, which transforms resources into final products; (b) the *support* system, which establishes norms of interaction between the subordinate systems and their components with the overall institutional system, as well as establishing the nature of its relationship with the environment; and (c) the *directive* system, which directs and guides the activities of all the other systems. The planning-execution process includes all of the systems at the national, regional, and local levels, however, the direction and guidance of the process is the responsibility of the directive system.

The directive system is made up of two subsystems, the *planning* system and the *decision* system, and has the following functions: directing the subordinate systems, permanently interpreting the problems of agricultural research and transfer, defining institutional policy, implementing the organization adopted or the changes suggested, coordinating the action of different components and elements of the Institute, carrying out the execution of specific activities, and controlling and evaluating results. The overall action strategy would be oriented toward strengthening the directive system and its mechanisms to achieve the necessary articulation between agricultural generation and transfer in the different administrative and thematic levels of the ICA and between the Institute and agencies in the public sector and the national, subregional, and international system for science and technology, as well as the organization of activities in the private sector.

Process of Policy Analysis

For the direction and guidance of the planning-execution process, the directive system needs long- and medium-term decisions as to orientation and operative decisions in the short term. To carry this out, the decision system requires permanent advice from the planning system through a process of policy analysis. The orientation decisions are considered at three policy levels: doctrine or philosophical framework (long-term plans), orientation framework

framework (medium-term plans and programs), and specific policies (projects). The operative decisions are considered at two policy levels: policy measures (operative plans/programs) and specific activities (sections of projects).

The philosophic framework represents the most general-level policies of the Institute, its long-term objective image, and the final vision of the organization and operation of the Institute. It expresses institutional principles, what the Institute represents to the agricultural sector, the guiding framework of priorities, what it hopes to achieve, and the overall strategies to be followed to achieve its objectives.

The orienting framework defines objectives that can be reached in the time period corresponding to a single presidential administration and the strategies necessary to achieve those objectives. It is developed on the basis of the philosophical framework, the technological diagnosis of the agricultural sector, and the overall performance of the ICA. It will be updated, together with the three components mentioned previously, with the information resulting from the evaluation.

The level of specific policies defines specific problems (put in terms of projects) on whose solutions the ICA will concentrate its activities. To do this, interdisciplinary group work is required, as is deep knowledge of the problems in specific areas and the ICA's performance in those areas. The projects, as well as the ICA's performance and activities, will be permanently adjusted as the result of evaluation.

The level of policy measures defines the criteria for the assignment of resources and the organization of the private and public sectors. At this level, definition will take into account specific policies and problems, by areas of activity, and the ICA's performance and that of the agencies participating in the execution of programs and projects in those areas, as well as the results of evaluation.

The specific activities refer to the results that are expected in the period corresponding to one budget exercise and, in particular, aspects of projects and programs. At this level, existing policy measures, the performances of agencies involved, and the results of evaluation are taken into account.

A first step in the implementation of the process is the development of the general lines for the adjustments in the existing philosophical and orienting frameworks. The office of the assistant manager for research prepared the philosophic framework and the divisions prepared their orienting frameworks. This first attempt was submitted to the consideration of the advisory council of the office of the assistant manager for research, and to the advisory councils of the division directors, the regional managers, and the regional section chiefs. The regional level presented its criticisms and suggestions in writing.

Project Identification and Formulation: Conceptualization

Part of the implementation of policy analysis was the design of a single instrument for the preparation of ICA projects, which will include the procedures and methods that the Institute has been using. This is done to adapt it to the planning system to be implemented, to the redefined indicators that will measure the scope of objectives and goals in space and time, and the execution of activities and utilization of resources. The normativity of this instrument would be essential to facilitate follow-up and evaluation.

A proposal has been developed for the function of follow-up and evaluation. Taking into account the present organization, an information flow, and instruments to operationalize the functions of follow-up and evaluation, and those responsible, articulated at the local, regional, and national level, has been proposed.

Evaluation System for Economic Impact

The proposal sought to create a mechanism for evaluating the economic impact of ICA research. It would generate periodic, cumulative, and systematic information on the economic contributions of research by means of an annual report. The proposed mechanism would consider three major categories of economic effects of research: (a) the magnitude of the economic excess generated, (b) the distribution of the excess, and (c) participation and conservation of different production factors.

The specific objective of the system would be to determine the previously mentioned effects, which would allow the ICA and the government to judge the economic rationality of their research spending, in two ways: (a) determining whether the quantities assigned have been evaluated in terms of their implementation with respect to the economic benefits obtained from other options and (b) reorienting resources from specific areas with fewer benefits toward areas that produce greater benefits. The system would have two levels: one of ex ante evaluation of research proposals and another of ex post evaluation of finished research. The proposal focuses mainly on ex post evaluation and suggests beginning evaluation with a valorative methodology (Delphi), in which groups of qualified judges estimate the magnitude of the effects. Parallel to this, the appropriate data bases are established and rigorous models are specified and tested. For data, a wide-ranging collaborative and coordinated effort would take place throughout the ICA with the participating external institutions.

In organizational terms, the system would have a coordinator responsible for it in the Economy Program, which could alternatively be located in the Planning Office. The coordinator would project internally to the unit and to other programs and divisions under the three assistant manager's offices; externally, to the producer's associations, unions and universities.

Priorities

Given a lack of resources with respect to the scope of research possibilities, there should be priorities established for resources and tasks. Priorities cannot be established simply by considering the expected merits of possible research projects (ex ante evaluation). As an alternative, planning should locate the socioeconomic level that the most important results should reach and concentrate research there to contribute to specific achievements. This has previously been done in the ICA through efforts made by a team from the Ministry of Agriculture (POAS), the National Planning Department, and the ICA. The present proposal offers a conceptual framework to develop priorities.

The main conceptual innovation that the present study offers lies in the integration of the most important variables that affect socioeconomic and research priorities in a systematic and coherent analysis structure. First, a distinction is made between three closely interrelated levels: (a) socioeconomic, production objectives, and benefits; (b) technical, procedural, and production systems; and (c) technological, i.e., knowledge of technical aspects.

The process of production derived from the previous propositions includes the following stages:

(a) *Socioeconomic stage.* Given a selection of policy objectives sought, the species and regions are prioritized separately and individually, and priority beneficiaries are also identified. The results are later integrated to distinguish a "priority range" of beneficiaries, products, and regions for which the general technical and internal technological needs are considered.

(b) *Technical stage.* This stage included the identification of the most important production problems for the "priority range." Among these problems, the ones that have technical limitations or restrictions are identified. These are ordered according to their utility and the urgency with which they must be solved.

(c) *Technological stage.* For the ordered set of problems with technical restrictions, it distinguishes those that can be solved with available technology and those that require research. For the latter group, criteria are proposed to distinguish which can be solved by the ICA within its national research system. Then, the viability is studied, as are the conditions for the search for technological solutions; these are ordered according to the priority of urgency and utility. The final result will allow for the identification of the subgroup of technical restrictions that the Institute will take on during the specific budget period and for which a budget proposal will be made. Restrictions not included will be considered in later years.

In the verification, approval, and assignation stage, the results are passed on for consideration by the Ministry of Agriculture, which, after reviewing them, will suggest changes or recommend approval and determine the Institute's assignation. The priority study will be coordinated by a technical team from the NPD, the Ministry of Agriculture (POAS), and the ICA. For the scientific, technological, and sociopolitical evaluation, specialists will be sought in and out of the ICA. The generation of points will principally occur through the use of appreciative scales, whose results would be integrated to obtain weighted, aggregate values.

Information

Beginning with the concept of an overall master system, two or three master subsystems (technical and administrative areas or areas corresponding to assistant managers) will be identified and defined with the help of the preliminary base study. As general orientation, a structure according to functional areas and groups would be created in which the teams would be divided and the responsibilities would be decentralized, as far as possible, to be reintegrated into coordination and control networks. In organizational terms, conceptual and operative support mechanisms would be created. Globally, there would be a consultant and planning commission for information systems and a support office. At the level of master subsystems, and later, at the level of specific subsystems or data banks, other mechanisms would be employed. Other points covered by the proposal are those related to the internal policies and support required, especially with respect to equipment and training and suggestions for implementing the recommendations.

Base Evaluation

An inventory, classification, and analysis of the projects and experiments under way was made, which will permit the coherence of activities in progress to be evaluated with respect to the problems and activities pointed out by the NPAR, the 4-year investment plan, the NPAT transfer activities, and operative programing.

Conclusions

The validity of evaluation as an integral stage in the planning process has been closely linked to the 1968 creation of the NCSEP and the NPD. In 1969, the ICA began the organization of its own Planning

Office. By law, the NPD must evaluate the execution and results of general development plans or programs. In turn, the NCSEP recommends the plans and programs that the government submits to the consideration of the National Congress.

The Division for Agricultural Production of the NPD evaluates, in agreement with overall policy, the effectiveness and efficiency of public and private activity in the area of agricultural production and production programs proposed by the Ministry of Agriculture to determine their proposed incorporation into the investment budget for agencies of the agricultural sector. The ex ante evaluation of specific projects is done by the Division for Technical Cooperation. In the Ministry, the POAS evaluates the execution of programs and projects in the sector and proposes necessary adjustments.

According to the organizational statutes and decrees of the ICA, the overall evaluation of institutional policies, plans, and programs corresponds to the Management Committee. The overall evaluation of the impact of ICA activities in the sector is the function of the Planning Office, as is the evaluation of projects and activities financed by foreign loans. The IDB project, which is presently being financed with World Bank funds, and the ICA–USDA program for animal sanitation are evaluated by the coordinating offices organized as a requirement suggested by the financing agencies.

With respect to technical activity, the assistant manager's office for agricultural research and transfer is in charge of evaluating the technological limitations and overall production factors by species and ecological areas, as well as the activities carried out by the divisions, the ICA–IBRD coordinating office, and the regional research directors. The programs, projects, and activities are evaluated by the division program and project directors.

Impact evaluation of programs and projects that report to the assistant manager for research at the national, regional, and local levels is the responsibility of the technical support division, which reports to the assistant manager for research as well. The evaluation of the financial aspects is carried out by the assistant manager for administration. The regional managers and the directors of the regional research sections, centres, and stations have not been given any direct, regulatory responsibilities other than the execution of policies, projects, and activities. Although the evaluation function is explicit in the statutes and decrees of the Institute, the degree of fulfillment is generally low for all areas, with very few exceptions. The execution of evaluation activities is uncoordinated, irregular, sporadic, and circumstantial in most cases.

The behaviour of the evaluation function mentioned is closely related to the variables of the activities of institutional planning, sectoral planning, and the national planning process in general. In practice, the planning process operates only as a mechanism for the assignation of resources, principally because of the lack of national and sectoral long-term plans. In the mid-term, although there are five national development plans, in the majority of cases, they have begun rather late in the presidential administration and without the debate that should take place in the Commission to support politically the objectives and goals of the government.

On the other hand, the agricultural sector has lacked clear long- and mid-term policies to orient agricultural development and technical–scientific activity. The Ministry and the Planning Office have been technically weakened, gradually losing their capacity for formulating plans and programs, coordinating the sector, and following and evaluating the activities of the decentralized institutes.

The definition of priorities has depended mainly on situational conditions and the need to obtain short-term results, which gives immediate information on decisions made. The framework of priorities by product and ecological zones that has been formulated has not had the necessary political consensus to limit frequent changes in priorities, which brings about instability in the directive personnel in the Ministry of Agriculture.

With respect to the stages of the process, except for annual budgeting, the periodic review, and reformulation of the 4-year investment plan and operative evaluation, the remaining stages of the process are not carried out uniformly and systematically. Under these conditions, given the nature of research activity and its results, it is extremely difficult to carry out the planning–execution process for ICA activities in the agricultural sector adequately and systematically. Internally, the low degree of fulfillment of the function is attributed to the lack of an institutionalized planning system, the centralization of coordination and evaluation of execution, complexity of tasks, excessive number of functions, fractioning and possible duplication of activities, and frequent changes in the organizational structure, in general, and in the Planning Office, in particular.

Information, its flow and systematization, is perhaps the greatest factor influencing the evaluation function. Because of the nature of the ICA's functions, volumes of information are utilized and generated in many diverse areas. Historically, however, there have not been organizational structures or essential mechanisms for the appropriate management of information. Throughout ICA's existence, there have been many partial and isolated attempts in different areas and with variable continuity to improve the situation. Although they represent valuable efforts, they also bring the danger of creating a generally undefined system and unnecessary duplications. The weakness of this critical factor for evaluation and decision-making penalizes the efficiency and effectiveness of the Institute.

Systematic evaluation on an institutional basis of economic impact has been occasionally and punctually done through theses at the National University — ICA Graduate School. The methodology used, for this type of evaluation, as well as for analytical evaluation and the evaluation of results, has only partially touched the range of effects and impact of research. Conceptually, the existing methods are partial and incomplete for systematic evaluation. In the evaluation of economic impact, the globally generated excess, and sometimes its distribution among producers, is considered. When this is the case, there are limitations because other factors are not considered. Methodologically, the studies are based on production functions, numbers, indices, and multivariate analysis. The function of production focus offers greater information, but its usefulness is limited to having the appropriate specifications for the functions and available data.

Base evaluations are not carried out with unified criteria in a coherent, systematic manner. In general, there is little up-dating of studies, given the dynamic rate of change that the Institute must study. The information generated by operative evaluation of the budget is difficult to manage and to publish, which further impedes its distribution and use.

Ex ante evaluation of research projects has not been institutionalized and, therefore, many regional and local projects are carried out without this formality. The economic evaluation of results is also carried out irregularly. The traditional form of evaluation is, with some exceptions, a list of activities and tasks carried out and operative problems, with little reference to what was initially programed and its expected impact. The necessity of implementing and institutionalizing a planning system is shared by the authorities of the ICA. The methodological proposals formulated at the end of 1984 and the beginning of 1985, especially with reference to institutional philosophy, orientation framework, operative planning, identification and formulation of projects, and the function of follow-up and evaluation, have brought about diverse reactions.

A general criticism of the documents has been the terminology used, their length, and the complicated conceptual level and writing, all of which make comprehension difficult. In addition, the forms that are used to collect the basic program information, its programing, follow-up, and evaluation require greater simplification, both in the number of variables and in the description. This is especially true for financial variables, budget execution, tasks, and activities. The number of reports and their frequency and complexity have also generally been criticized in the information instruments and flows, which would form the functions of follow-up and evaluation; however, the need to implement, apply, and evaluate the instruments, once the objections raised have been solved, is accepted.

Recommendations

Given the history and the state of the available information analysis, the decision to implement and institutionalize the planning system in the ICA, through successive approximations, is required. It is necessary, however, to facilitate this mandate by means of a management resolution that expresses the general objective, the specific objectives, the products expected, and the participation and information mechanisms with respect to the environment. For internal organization, it would be sufficient to name an action group and the person responsible for it. To support the implementation of activities, there could be national or international technical assistance. At the level of each assistant manager, consensus would be sought for action among the respective division directors.

The implementation and the institutionalization of the system would be an interdisciplinary project that would horizontally and vertically integrate the different activities of the ICA. As such, one of the first tasks for the action group would be the formulation of the project. The ex ante evaluation of the proposal, as well as follow-up and partial and final evaluation, would be the responsibility of the management committee. The adjustment of the documents, instruction guides, and the forms proposed would be one of the most immediate activities. This material would be the principal resource for promotion and training activities of the professional personnel participating in the project.

According to the strategy of successive approximations, it is recommended that the task begin in two divisions and two regional management offices. The divisions would be representative of the areas of research and transfer, on the one hand, and of promotion and services, on the other. Once this first stage is finished, the first evaluation of results would take the place of the mechanisms and instruments used. With this information, the initial project would be reformulated.

The improvement of the evaluation function in the ICA could not be considered without taking on a significant effort to rationalize the use and management of internal information in the ICA. To make this task more concrete, the participation of POAS and the division for agricultural production of the NPD would be helpful. It might also be a good idea to reformulate the priorities by product and by ecological zone. This should be jointly done with National Planning, the Ministry of Agriculture, Fondo Colombiano de Investigaciones Científicas y Proyectos Especiales Francisco José de Caldas (COLCIENCIAS), and the ICA. The results obtained would be an integral part of the policies for the agricultural sector in the medium and long term. Within this framework of priorities, the NPAR and the NPAT would be immediately adjusted. Given the unity and continuity of the planning–execution process, it should be noted that every effort to improve and strengthen the evaluation function requires parallel actions with the same degree of intensity for the improvement of the programing, implementation, and follow-up stages.

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Agricultural Research Evaluation in Latin America: A Literature Review

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This study identifies the present state of agricultural research evaluation in Latin America, based on a review of the literature on this topic which only began to appear in 1970. The sources consulted to identify available literature for each of the aspects of the research process and the impact of its results are mentioned.

The compiled information is analyzed following the elements that make up the research process and its interface with the productive system, followed by general conclusions and recommendations.

Most of the titles compiled refer to studies on technical change and the modernization of agriculture including ex post evaluation. These studies look at the economic benefits and use different methodologies to determine the profitability of research, which in most cases is quite high in comparison with other activities. In contrast, there is very little literature on the social impact or influence of research on agriculture.

With regard to ongoing evaluation of the research process, again there is little published information available and there are large gaps. The stress is on the lack of monitoring procedures, the lack of methodology to evaluate scientific results, the need to regulate periodic technical meetings and reports, and the urgent need to propose adequate models to institutionalize this function. Also, very little has been published on ex ante evaluation in Latin America.

The general topic of research evaluation is relatively new, especially in the field of agricultural research in Latin America. The discussion on evaluation began indirectly once studies were carried out on technical change and the modernization of agriculture. The need for evaluation was clear when research funding was restricted and when the practical implementation of the results of research began to be questioned.

This study approaches the topic by considering some questions used as guidelines in analyzing the literature. At what level is the evaluation carried out and by whom? When should it be done? What is being evaluated? At what cost? What is the usefulness of the results? What are the main difficulties or limitations in carrying out the evaluation?

The titles reviewed are very specific to areas and products. Several of the articles refer to the economic impact of technical change in agriculture as an indirect form of evaluating research results; however, it was not possible to find material on certain aspects of those questions. Conclusions and recommendations are also presented on the literature review and on the topic of institutionalized evaluation of agricultural research.

The literature review in general permits a rapid overview of the present state of development in the field with regard to the conception and models used in agricultural research as well as to identify some trends and gaps. A deeper analysis, however, would require a new study.

Research Infrastructure

Research on agriculture and livestock in Latin America, dating back to the middle of the last century, began to institutionalize in the late 1940s with the establishment of specific divisions for the generation of technology within the respective ministries, mainly of agriculture. At the same time, advanced academic training began essentially in the United States, with the participation primarily of agronomists specializing in plant pathology and plant breeding. The guidance received by those who later headed research in their countries, was reflected in their respective institutions.

The 1960s were characterized by the setting up of decentralized, autonomous public agencies responsible for research. Later the majority of the countries established autonomous institutions devoted mainly to agriculture and livestock research. From the beginning, most of the new agencies institutionalized the planning function, which was in general coordinated by an office directly responsible to the highest echelons of the institution.

By the end of the 1960s and the beginning of the 1970s, these institutions reached a high point of development. By showing their management efficiency and the impact of their results, they received the necessary backing and gained appropriately trained personnel. This backing, however, also brought additional functions that were in some cases related to research, as extension and transfer of technology, but, in other cases, these functions were broader, covering promotion, development, technical assistance, and activities such as sanitation or quality control.

In the second half of the 1970s, these institutions began to deteriorate. One of the reasons was because of the world financial crisis, which brought with it a shift toward improved planning and priorities in research. At the same time, international financial institutions (the International Bank for Reconstruction and Development [IBRD] and the Inter-American Development Bank [IDB]) began to invest in this field.

The development of agricultural research in the region, the background and the institutionalization process, and the in-depth analysis of the factors directly related to that process, such as the question of specialized personnel, are all topics that have been dealt with by various authors. Especially noteworthy in this field are the efforts of the Inter-American Institute for Cooperation on Agriculture (IICA) with its research cooperative project on agricultural technology in Latin America (Proyecto Cooperativo de Investigación sobre Tecnologia Agropecuaria en América Latina [PROTAAL]).

From a review of the articles on the development of this field in the region, some noteworthy facts can be found relating to evaluation, the central theme of this paper. For example, the planning function in autonomous research agencies of the region was institutionalized almost from the start, and it was concerned with priorities and allocation of resources.

Agricultural research evaluation, however, is a relatively recent function that has not yet been institutionalized in the region. This was one of the main concerns in looking at the literature on the state of the art in this field in Latin American countries.

Development of Agricultural Research Evaluation

The interest about evaluation of agricultural research in Latin America is more recent than it is on a world level, and even at that level it is fairly recent. Before 1960, this function was almost totally undiscussed. It should be stated that information on evaluation was closely related to technical change and the economic impact in the majority of the initial documents. Ruttan (1982) summarized studies that analyzed the contribution of agricultural research to the growth of productivity in the sector. This information showed 30 titles and only one is dated before 1960. Ohayon (1983) reviewed 81 titles, of which only one was published before 1960, 29 during the 1960–74 period, 36 between 1975 and 1979, and 15 between 1980 and 1983. This bibliographical review covers several areas and focuses on Brazilian institutions and industrial research centres. It gives a general idea of evaluation in projects covering the field of science and technology in industry. Ohayon also states that the main reason for the increase and the success of recent evaluation studies are the growing interest in setting national development goals, the need for the practical applications of research results, and the interest to find rapid solutions to socioeconomic challenges. Lindarte (1985) reviewed 89 references for the period 1932–85.

The titles quoted by these three authors give an idea about when publication began at the world level. From the end of the 1950s publication increased, especially in the last 10 years. In Latin America, this activity began during the 1970s and intensified toward the end of that decade.

These brief notes on the historical development of evaluation are complemented by reference to a number of regional events at which papers related to the topic were presented. The first, mainly directed at the economic aspects of evaluation, was an international seminar on the "Evaluation Methodology for Agriculture and Livestock Development Projects" held in Montevideo, Uruguay, in 1976 and sponsored by IICA. A workshop for the English-speaking Caribbean was held at Port-of-Spain in 1981 on the "Organization and Administration of Agricultural Research." In cooperation with Yale University, the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), organized a workshop on "Socioeconomic Evaluation Methodology in Agriculture and Livestock Research," which was held in Brasilia from August to September 1983 and included the presentation of 35 papers. Finally, reference is made to the "Consultation of Experts on the Supervision and Evaluation of Agricultural Research in Latin America organized by the Food and Agriculture Organization of the United Nations (FAO) at the end of 1983 and held in Santo Domingo, Dominican Republic. The foregoing statements show that on both the world and regional scale, evaluation is a relatively recent function within the institutionalization process of agricultural research.

Compiled Bibliography

The main objective of this study was to inquire into the present state of evaluation of agricultural research in Latin America, the trends to fulfill this function, and the main topics being discussed in the region.

To meet this objective, information was requested from various known sources and a visit was made to several institutions in Brazil, Colombia, Ecuador, and Peru. During this visit, documentation on evaluation was compiled and general discussions were held on the activities of follow-up and evaluation of research results.

The search for documents stressing the Latin American content concentrated on the last decade, because this topic is one of relatively recent discussion. With the cooperation of bibliography experts of IICA (Bogotá) and the Colombian Agriculture and Livestock Library (BAC), a number of sources of information were chosen and listings requested according to a developed profile. This section describes these sources and gives a summary of the findings.

Sources

After a quick initial survey about agricultural evaluation and local consultation, information was requested from the following sources:

(a) The Inter-American Information System for the Agricultural Sciences — (AGRINTER) data base through the selective dissemination of information system of BAC in Tibaitatá and the statistics and biometry section of the Instituto Colombiano Agropecuario (ICA);

(b) The International Information System for Agricultural Sciences Technology (AGRIS) in Vienna;

(c) Bibliography prepared by the Inter-American Centre of Agricultural Documentation and Information (CIDIA), Orton library, Turrialba, Costa Rica;

(d) Documentation services of the communication and information unit library of the International Centre for Tropical Agriculture (CIAT);

(e) Available listings from the Information Retrieval Service (IRS);

(f) Bibliographies available in documents by other authors, especially Lindarte (1985), Ruttan (1982), and Ohayon (1983); and

(g) Materials compiled directly in Brazil, Colombia, Ecuador, and Peru, all available at the Programa Colombiano en Administración de la Investigación Agraria (PROCADI) (Colombian Agrarian Research Management Program).

Before requesting material from the different sources, a profile was drawn up to allow for the recovery of the greatest number of titles on the topic of agriculture and livestock research evaluation with Latin American content. In the cases of AGRINTER, AGRIS, and CIDIA, the descriptions used were key words already established in AGRINTER's list, such as agricultural research, evaluation, impact, profitability, technology, policy, program, project, and finally the areas of management and planning.

The request to CIAT was broader and included management and research evaluation in general, trying to direct the search to Latin America. In the case of the IRS, the listing was already available and originally it used the following fields: agricultural research, monitoring and evaluation, methodology, indicators, technique evaluation, review of priorities, cost–benefit, etc.

The literature quoted by other authors required no profile; however, it should be noted that it corresponds to the specific interest of the authors, and, in this case, the bias is toward the economic impact or benefits from research. The last source was the documents compiled at the institutions of the four countries visited. An effort was made to ensure that this material was representative of what was most recently being done in this field.

Bibliographic Production From Sources

AGRINTER

AGRINTER's listing had no summaries and covered 78 titles. All but one of the references had information on Latin America, and the list covered the years 1975–82. On this list, 17 of the 78 documents can be placed within the parameters of the topic of this study, i.e., agriculture and livestock research evaluation. The remaining 61 titles can be classified into commission or mission reports (about 15) with the majority referring to specific activities or prefeasibility studies and management (about 10). The rest covered project design and formulation for production and development, operational plans, yearly reports, and evaluation of products. Seven out of the 17 titles directly related to the topic could be classified as economic evaluation and six as technical evaluation of research results. The rest deal mainly with the establishment and organization of research evaluation programs and their problems and limitations. Several of them, eight out of 17, were papers given at regional seminars or conferences, most of them at the seminar the "Evaluation Methodology for Agriculture and Livestock Development Projects" held in Montevideo, (Uruguay), in 1976. Finally, of the 17 articles identified in AGRINTER's listing, 76% correspond to the years 1976 and 1977.

AGRIS

The AGRIS listing, without summaries, covered 144 titles, all on Latin America for the period 1974–84. The majority of these titles were from the years 1979 and 1980. Of the 144 documents, only 22 correspond to the topic of agriculture and livestock research evaluation. From the rest, 38 were related to yearly reports of country missions. They also included the costs of production of certain products, prefeasibility studies, technical behaviour of varieties, and the use and dissemination of technology as well as general programing aspects, yearly or 5-year plans, and research organization.

More than half of the 22 titles directly related to the topic could be classified as evaluation with attempts to measure the financial return and impact of technological change. Several of the documents were given as papers at regional meetings and seminars.

CIDIA

The bibliography without summaries prepared by CIDIA covered 23 titles, all Latin American for the period 1967–84. Only one title, however, dates before 1975. Of the 24 documents, 19 fit the parameters of this study. But it should be noted that most of them were papers presented at three events: (a) a seminar on the "Evaluation Methodology for Agriculture and Livestock Development Projects," held in Montevideo, Uruguay, 1976; (b) a seminar on "Organic-Administrative Aspects of Agrarian Research," held in Lima, Peru in 1979; and (c) the "Consultation of Experts on the Supervision and Evaluation of Agricultural Research in Latin America," held in Santo Domingo, Dominican Republic in 1983.

The titles from the CIDIA bibliography are in general oriented toward showing the benefits of the systematization of the evaluation function to improve research planning and to analyze the financial aspects or impact of technical change.

CIAT

CIAT's bibliography, in general with summaries, covered a total of 146 titles, of which 48 are Latin American. The information covered the years 1967–85, with a concentration of titles in 1977–83. The 48 references with information on the region deal with evaluation aspects and with management and organization of agricultural research. Several of the documents covered topics in other fields, some bearing little relation to this study.

Of the 48 titles with Latin American information, about 50% (26) were identified in the field of agricultural research evaluation through their summaries. The majority of the 26 titles were related to aspects of economic evaluation of agricultural production or technological change. Some deal with cost–benefit analysis or with its theory and evolution. There are some titles on topics such as the design of research projects, aspects related to investment and preinvestment, mechanisms for adoption of technology, and indexes and measures of economic efficiency and social benefits based on rates of return on investment.

IRS

The IRS listing covered a total of 65 annotated references, of which only nine referred to Latin America and covered the period from 1973 to 1982. This listing contains mainly materials from the years 1980 to 1982 (26 titles) and was requested by FAO in 1983 during preparations for the meeting "Consultation of Experts on the Supervision and Evaluation of Agricultural Research in Latin America" held that year in Santo Domingo.

On a world scale, the majority of the 65 titles concentrated on the field of evalution, both of research results such as the impact of technology and of the socioeconomic benefits of technological change. A few concentrated on topics such as the distribution of benefits, surpluses, production and simulation functions, rates of return, and the impact of technological change. Seven articles were chosen within the parameters of the study.

Bibliography/Other Authors

Information already analyzed was used. Lindarte (1985) reviewed a total of 89 titles, of which 26 correspond to Latin America and 21 titles are directly related to the theme of this study. This bibliography covered the years 1932–85, with 56 of the references published during 1975–85. The majority of the articles are directly related to the author's topic, the economic evaluation of agricultural research.

In his book *Agricultural Research Policy*, Ruttan (1982) analyzed 30 titles on the productivity of agricultural research, 13 titles dated between 1960 and 1974 and 17 between 1975 and 1979. The review covered the period 1958–79. One of the first pioneering studies on the economic evaluation of agricultural research was that by Griliches (1958). All of the studies correspond to the topic, seven of them are on Latin America and cover the years 1970–78. These titles were classified by the author under two categories: indexed numbers and regression analysis. The majority of the Latin American studies fell under the former.

Materials Compiled for this Study

Materials were compiled for this study during the visit to Brazil, Colombia, Ecuador, and Peru. This documentation is available at PROCADI's headquarters and includes 75 titles, all directly related to the evaluation of agricultural research in those countries. They cover the period from 1976 to 1985, with a concentration on the later years, and all the materials contain information on Latin America.

More than half of the titles are from Brazil. Colombia follows in the number of documents, then Peru, and finally Ecuador. The majority of the Brazilian material was produced by EMBRAPA, and 10 of them are related to impact evaluations based on the results of rate of return estimates. Others deal with the evaluation of research results, especially with regard to personnel training at the institute. In the Peruvian case, six documents were compiled, mainly from the Instituto Nacional de Investigación Promoción Agropecuaria (INIPA). Four are related to the organization of the Institute's activities and functions, among them monitoring and supervision of research activities, the other two documents deal with the evaluation of the impact and profitability of research investment.

In Colombia, ICA has intensified its actions on evaluation and monitoring of agricultural research. Two documents should be noted. One to organize all the planning activities within the Research Office, including formats for project design and monitoring, the other, to institutionalize economic evaluation of agricultural and livestock research.

Summary of Regional Bibliographical Production

The literature on evaluation concentrates on the aspects of the economic impact of technical change in agriculture and on the importance of institutional structures of research and development in the modernization of agriculture. In general terms, the approach used in these studies is based on the pioneer work of Griliches (1958). Studies with Latin American information begin in 1970 with Ardito Barleta's thesis using Mexican material; Ayer's thesis in 1972 on cotton in Brazil; and Ardila's thesis in 1973 on rice and Montes' on soya, both derived from Colombian information. Based on these titles, there is a 15-year lag between documents published on a world scale and those with Latin American information on agricultural research evaluation.

Although it was possible to compile a total of 409 titles with Latin American information, it should be noted that only 181 of the 409 were chosen (45%) as pertinent to this topic (Table 1). Several of the Latin American titles related to theses for higher academic degrees, corresponding to universities in the countries generating the information and in U.S. universities. These results were later published, and they are quoted by various sources.

With regard to the personal compilation of materials in the four countries, the effort being made by EMBRAPA is especially clear over the last 5 years. There are three teams involved with this topic, each of them with specialized personnel, several of them with PhDs, and they are integrating their efforts to carry out evaluation activities on institutionalized research.

After EMBRAPA, which produced almost 50% of the materials compiled, comes the Colombian effort with ICA's intentions to progress in this field. Both INIPA in Peru and the Instituto Nacional de Investigaciones Agropecuarios (INIAP) in Ecuador are at the reorganization stage and have little material available. It is interesting to note that a large part of the materials compiled for this study corresponding to the years 1982–85 has not reached the data bases of the sources consulted. Finally, it should be stressed that the majority of the documents consulted, as well as the materials compiled, concentrated on the economic impact of technical change in agriculture as an indirect form of evaluating research results.

Information Analysis

The documents compiled in person make up a list of 75 titles, a copy of which is available on request from the author. Twenty-eight were chosen for deeper examination, and most are included in the bibliography at the end of this paper. From those titles, almost all of the 28 were published between 1982 and 1985. One-third refer to project evaluation and

Table 1. Sources, number of titles, and periods covered in articles published on agricultural research evaluation.

Source[a]	Total references		Latin American references		Documents consulted and bibliography
	Number	Period	Number	Period	
AGRINTER	78	1975–82	77	1976–81	17
AGRIS	144	1974–84	144	1974–84	22
CIDIA	23	1967–84	23	1976–84	19
CIAT	146	1967–84	48	1970–84	26
IRS	65	1973–82	9	1973–82	9
Lindarte	89	1957–85[b]	26	1972–85	21
Ruttan	30	1958–79	7	1970–78	7
Compiled[c]	75	1976–85	75	1976–85	75
Total	650	1957–85	409	1970–85	196[d]

[a] AGRINTER (Inter-American Information System for the Agricultural Sciences), AGRIS (International Information System for Agricultural Sciences Technology), CIDIA (Inter-American Centre of Agricultural Documentation and Information), CIAT (International Centre for Tropical Agriculture), and IRS (Information Retrieval Service).

[b] Only quotes one article from 1932, the rest of the information covers 1957-85.

[c] These are the documents consulted appearing in this study for which 28 have an entry card.

[d] This grand total is reduced to 181 when duplicates are eliminated, and 75 appear as consulted documents found at the Programa Colombiano en Administración de la Investigación Agraria (PROCADI).

the rest to evaluation of institutions, and programs on specific topics. The majority of the documents are from EMBRAPA and nearly all refer to ex ante evaluation. They also refer as much to internal as to external evaluations and, on some occasions, to mixed evaluations. Most of them refer to economic evaluation and profitability, impact, distribution of benefits, and investment and socioeconomic evaluation. Several of these publications address theoretical issues, and others attempt to propose models or rules.

Analysis

A model of the agricultural production process and how the research component fitted that model was proposed in the original Spanish paper. With that reasoning, several elements were identified and were taken into consideration when the search for literature was done. This English version does not include that information, however, those elements were maintained in this chapter for the analysis of the literature review.

Level of Evaluation

Institution It has been stated that institutions periodically review their policies and general objectives to bring them in line with the changing situation that surrounds them. It is interesting to note that the four institutions visited were in the process of restructuring or had carried out recent changes. In the case of Peru, the International Service for National Agricultural Research (ISNAR) had gone on a mission to INIPA; its report was not yet available, however, when this study was prepared. Of the information compiled, only two documents deal with investment and profitability at the institutional level.

At the institution level, there are programs that rather than being evaluated are periodically reviewed. Of the 28 entry cards, seven deal with programs, some of them on extension or technology transfer as well as training. One should stress here the technical reviews, generally done every 5 years, and external reviews being carried out for the 32 International Potato Center (Centro Internacional de la Papa [CIP]) programs through planning conferences.

Latin American literature is scarce on evaluation at the institutional level. International centres have been undertaking external reviews every 5 years organized by the Technical Advisory Committee (TAC) for the Consultative Group on International Agricultural Research (CGIAR). Both the FAO and now ISNAR, are bringing out conceptual materials drawn up to guide program review missions to different countries. As this is a recent activity, it would be interesting to specify methodologies and adapt material of this sort for research institutions of developing countries. Another alternative would be to start up an institutional self-evaluation plan as proposed by Marcano (1984).

Project The majority of the studies examined refer to this project level, and a good number of them refer to economic evaluations. The experience on this level is undoubtedly greater as both national and international funding agencies, as well as some of the agencies carrying out the research, have made efforts to design, formulate, and develop projects not just for research but also for other activities in the sector. Several international agencies have evaluation manuals for the projects they fund, and, consequently, these evaluations are mostly externally decided. In some cases, periodic evaluations may be established to be carried out during the project, in other words, follow-up or monitoring activities to make the necessary adjustments along the way.

Experiments At the concrete actions or activities level during research, technical monitoring is essentially done by the researcher under the control or supervision of the project director. This level is mentioned only in one title besides the references to the pertinent parts of operating manuals. This is an area that requires greater reflection and possibly more work to document experiences that already exist.

Technical/scientific personnel In general, staffing is covered by the respective personnel offices of research institutions. In the literature reviewed, little was found on this subject. In some of the 60 documents reviewed, the topic of evaluation of training programs is dealt with, especially with reference to academic specialization. In these cases, there was an evaluation or review both of the program and of the impact with the organization of the work carried out by this type of personnel. On a more general level, the PROTAAL group carried out numerous studies on the specialized personnel in several Latin American institutions.

Who Evaluates?

Internal This evaluation is generally carried out by the personnel who executed research and, normally, they are from the same institution but are involved with other projects or programs. Several of the articles reviewed deal with this topic from the point of view of supervision or technical monitoring of research. Although these authors agree in stressing the monitoring strategy, such as periodic meetings and reports, as a means to measure results, neither meetings nor reports are sufficiently regulated and enforced to fulfill the objective. International centres have been doing this at their yearly programing meetings.

Apart from the effort proposed by Marcano (1984) on institutional self-evaluation, little or nothing has been done with regard to internal program and institutional evaluation. This is one of the areas where methodologies and strategies should be proposed to help the institution and its programs adapt to the changing needs of the environment they work in. Training of personnel in this type of evaluation is also lacking.

External The review of programs and the evaluation of projects funded by agencies other than those performing the research is usually carried out by external missions. The most interesting case examined was that of the planning conferences at CIP where a panel, with a number of renowned scientists selected from within each field, meets every 4–6 years to formulate recommendations and produce a report on the respective program. The majority of the evaluation studies on production or on impact are carried out by independent consultants. ISNAR has issued guidelines for external evaluation drawn up for its review missions. FAO also has its manuals and instructions on the subject.

When is Evaluation Carried Out?

Ex ante In general, ex ante evaluation studies are more recent than ex post. The former correspond essentially to conceptual and theoretical frameworks that are later tested as models against selected information. Of the literature reviewed only one refers to ex ante evaluation and it examines several models with studies under way in Brazil.

Most research funding agencies, both international and national, carry out some type of ex ante evaluation to decide which project to fund, especially when there is a range to choose from. In Colombia, a guide to project formulation has been drawn up considering this kind of evaluation. Ex ante evaluation is both recent and theoretical and this is why within this review there are so few articles on the subject.

Ongoing evaluation While a project is being executed, there is evaluation or rather monitoring. This type of evaluation is more technical than socioeconomic in nature and is carried out either by the researcher or by the project director. In this review of the literature, few documents dealt with this activity.

In general, these articles correspond to internal program analysis or project execution. They reflect on the need to review periodically what is being executed to introduce necessary changes in a timely fashion. Other studies mention the work of periodic technical meetings and reports. Some operations manuals deal with this subject and recommend the reports as the unit of measurement but do not regulate them.

The task of evaluation or monitoring of projects overlaps with internal evaluation, because it is essentially a technical evaluation carried out almost exclusively by the researchers themselves. Reports should be both on a regular basis and written in such a way as to facilitate the evaluation process. Once more, CIP's experiences in this area should be utilized.

Ex post Once the project or activity has been completed and the results disseminated, the evaluation or measurement of its effects or impact begins. In general, this only takes into account effects already caused. Although, as in the case of hybrid maize, these evaluations are frequently supplemented with estimates of the impact or effect that will take place after the evaluation. Furthermore, as already stated, the results of ex post evaluation become indicators that assist in the decision-making process and in setting priorities to determine which projects should be carried out. In this case, the results of this evaluation become ex ante.

Most of the documents reviewed belong to this category and concentrate on aspects of the economic impact of technical change in agriculture as well as in the effect of the institutional research and development structure in agricultural modernization. In general, these studies follow the economic approach of neoclassic theory, based on the handling of concepts such as production functions, index numbers, and consumer and producer surplus.

What is Evaluated?

Scientific knowledge The evaluation of research results on a scientific and academic level is difficult and is generally carried out by peer reviews either at scientific meetings or through publications in well-known journals within the scientific community. An indicator, therefore, to evaluate the quality of scientific knowledge, both of an institution and of a researcher, would be the number of articles published in recognized scientific journals. This system as used in developed countries would have to be adapted to fit within the context of regions where little is written because of the lack of publishing means. Furthermore, the incentive of traveling to deliver papers at meetings is increasingly complicated by bureaucratic paperwork in the official agencies of all countries and by the limited resources for this activity.

One of the articles reviewed deals with the quality of research. This type of evaluation is increasingly important in view of the growing volume of activities at the respective institutions and the growing public interest shown in this field. The authors recognize the complexity of the issue and have used a quality index obtained through employing a methodology for classifying quality into good, medium, and poor categories. This paper establishes indexes of agreement and visibility and concludes that having examined the different forms of validation, evidence suggests that the quality index does effectively measure the quality of research.

Apart from the work already noted, there was no information reviewed on the evaluation of scientific knowledge produced from projects during the research process. It should be noted, however, that several of the documents not chosen for detailed study referred to the evaluation of genetic material and the review of methodologies.

Technological results After research is done, the first phase is the contact between the recommendations and the target (productive) environment. Adjustments are generally done here at regional trials that are carried out with the advanced material preselected by the researcher. In some cases, the farmer participates in the evaluation and selection of that material.

The majority of the documents take research results into account once they are in the productive phase, a point far from the culmination of research execution, and after considering other factors such as inputs to permit the fullest possible use of the results of research. The control of researchers over their results, however, has been almost totally lost.

Technological results are reported on in publications, based on records of programs or journals of the institute. This type of document, such as yearly reports, which primarily inform on research progress, was not examined in this study. These results can also be presented as technical evaluations of new materials generated by research. Certain evaluations take place during the annual monitoring meetings, but, as already mentioned, these should be organized in such a way as to allow a periodic evaluation of the results presented at such meetings.

Dissemination of technology Although several authors note the importance of the transfer of technology in the dissemination of information, only three attempt to measure the cost of this stage and the increase in benefits. This is a transitional stage between the research process and production. A good recommendation that is not disseminated will have no impact on production, just as a good recommendation that does not use appropriate channels will not reach the producer. The means of diffusion may limit or delay the dissemination of good recommendations that have already been tested at the producer level.

In Peru, specifically designed questionnaires are being used in several regions to measure the impact of research recommendations. The questionnaires were designed to measure the influence of the extension system in the task of disseminating the results; however, no analysis of the first results has been completed as yet.

The efficiency of dissemination or transfer of research results can also be measured through rural development projects. In this case, it is necessary to calculate the relative weight of technology against other components that influence development.

The issue is a complex one, as is the model to measure the contribution of the dissemination stage to the final contribution of the technical change. Without valid recommendations from research (technology), it is difficult to justify a technology-transfer system, but, at the same time, without this channel, technology will take far longer to reach the process of production. There is a relationship of mutual dependence, and it is difficult to find a model that will separate their respective contributions. This field is open to further study and is an area where communication channels and message design are very important, as is counting on the appropriate technology to transfer.

Impact For the purposes of the literature review, this study has differentiated between the economic impact and the improvement in the producer's welfare as a result of the introduction of research recommendations into the production process. Most of the evaluation studies reviewed concentrate on the aspects of the economic impact of technical change in agriculture and the importance of institutional research and development structure in the modernization of agriculture. These studies, with objectives other than evaluation of the research process itself, have generated valuable information on the profitability of investment in this activity. These results have been important in resource allocation for research.

Although several of the papers on the economic impact also deal with the distribution of benefits, they do so at the macro level, in other words, at the national or regional level, and in most cases use the concept of an economic surplus.

The papers reviewed have produced precise and valuable information on, for example, the rates of return on investment. These results, however, are precise only for very specific periods and for just a few products. Although models have been designed to cover many of the factors that affect technical change, these models are very complex and are difficult to handle, especially within the tropical environment of developing countries. Less complex models, however, cannot cover all the spheres of influence and, therefore, to the unprepared observer, especially coming from the biological sector, these studies give the impression of being ad hoc. A contributing factor is that this field has been more of an area for individual research or small teams carrying out single or isolated studies.

In contrast to the abundant literature on the economic impact, literature on the effects of research results on the producers' welfare, especially those within the peasant economy, is rare. Some of the articles on rural development projects deal with this subject. Tobon (1985) measures change with indicators such as surface area covered with technical assistance, hectares under cultivation, yield per hectare, number of users attended, and net income per family and credit granted.

Tobon's (1985) work also proposes other elements to measure impact. One could be institutional or the contribution of the project to changing the approach to research. Another is a change of attitude at the researcher's level. Finally, the development of that project served to initiate others.

It should be noted that among the documents reviewed no reference was found as to how research results change the quality of life of the producer, nor were there any attempts mentioned to measure that change. Furthermore, it is worth highlighting the fact that the technician/scientist has little direct participation in field production where the economic impact is measured by economists.

Related Evaluation Aspects

Why Evaluate?

Several of the authors reviewed agree in stressing the following important reasons for evaluating:

(a) It is a way to measure whether the objectives and goals originally established were met. To do this it is necessary to begin with clearly defined objectives and measurable goals;

(b) The evaluation results should be fed back into the research process to ensure that the appropriate changes are made if necessary;

(c) Evaluation furnishes financial information to justify the need for resources and a greater investment;

(d) The evaluation information becomes a valuable precedent to establish priorities and resources allocation; and

(e) It keeps research on the right track and offers information that allows the setting of minimum project standards to comply with the objectives, thus contributing to a more efficient process.

What Does Evaluation Cost?

None of the articles reviewed addresses the cost of evaluation. None of them even suggests ways of doing it in the future. Clearly, the first direct cost is the payment of salaries to those who undertake this task. Certainly, there are various indirect costs involved in this work. One that is implicitly but not clearly stated is that of student theses, where students put in additional efforts on their own to finish the task. This is vital to the topic of economic evaluation, because several of the articles reviewed contain thesis information. Another indirect cost is the time researchers devote to these activities and, above all, the negative impact it can produce on scientific personnel with some evaluation results.

The scarce information points to the high costs of evaluation, but they have not been calculated nor is there any short-term interest in doing so. It would be appropriate to put forward some effort on this topic and analyze its influence.

Information Needs and Evaluation Indicators

Nearly all authors refer to the importance of counting on adequate information, which eases the evaluation process. Within this review, however, very few articles were related to this topic. Evaluation requires valid and up-to-date information, one of the main reasons for recommending computerized information at the institutional level.

Only one study deals with the specific subject of indicators. These should be used for monitoring and evaluation of research. To be functional, they should fulfill such characteristics as precise measurement, a reasonable cost, estimated over relatively short intervals, and allow a high repetition of measurement. Compiling information to determine the indicators poses several problems and, once determined, they are rarely used, especially in the case of agricultural research in Latin America.

Conclusions and Recommendations

The evaluation of agricultural research is a topic that has only recently been discussed. The publication of studies on this subject began in the 1950s in the U.S., whereas Latin American studies can only be found from the 1970s.

Most of the latter concentrate on aspects of the economic impact of technical change in agriculture and on the importance of institutional research structures for the modernization of agriculture.

Evaluation, in contrast to other functions such as planning, has not been institutionalized. Its recognition began indirectly with the studies already mentioned, and became more apparent when financial restrictions for research activities appeared and the scope of agricultural results began to be questioned.

Institutions and programs are both reviewed. The project, as the basic operative unit of research, is evaluated and experiments or activities are supervised and monitored. This study has concentrated on evaluation aspects of research projects. A literature review on the results of these projects has been presented, seeking information on the evaluation of scientific knowledge, technological results, dissemination of results, and the economic and social impact of technology.

This literature review, which included 181 titles relevant for evaluation, brought to light some interesting aspects. There are areas with large gaps, where either nothing has been done or little has been published. The stress here is on the lack of rules for the monitoring of experiments, the lack of models to evaluate scientific production and technological results, the reduced activity in ex ante evaluation, and the absence of agricultural researchers in evaluation of the economic impact. But perhaps most noticeable of all is the lack of indicators to evaluate changes in the quality of life of the producers. Also it is clear that there is a lack of training programs on research evaluation.

The institutionalization of evaluation in research agencies is an important task that should be undertaken as soon as possible, although this task is complex and slow. To initiate it, three main requirements must be complied with. First, a division of labour by projects, as the operative unit, and these should have very clear objectives and measurable goals. Second, it should be possible to rely on an up-to-date information system that is flexible and timely to provide promptly the necessary elements for decision-making. Third, to carry out this task, the main objective of evaluation should not be to control but to obtain updated information to feed back into the research process. To speed up the institutionalization process some measures should be taken to create a favourable atmosphere among researchers.

To have appropriate information to feed back into the research process it is necessary that all the technical/scientific personnel be directly involved in evaluation activities or, if not, that they at least be aware and interested enough to allow others to be involved. This will certainly necessitate taking the time to convince personnel of the usefulness of the system.

Most research institutions carry out technical meetings and request reports, but little has been done by way of regulating both the meetings and the reports. The former should be organized to permit the monitoring of research progress during the periods between meetings. The latter should follow certain guidelines to facilitate the periodical comparison of information. This is an area where much can be done to improve the efficiency of these events and strengthen monitoring and evaluation activities.

It would be interesting to document how international centres organize and carry out their yearly programing meetings, i.e., an in-house review, and how programs are reviewed or evaluated at those meetings — all of this being done with a view to adapting the methodology to the needs of national research systems in developing countries. It would also be appropriate to adapt the procedures of the CGIAR's 5-year review of international centres to evaluate programs at the national institutions.

The foregoing comments were related to the process and results of research itself. As can be seen from the literature reviewed, however, this is one of the least documented areas, so it will be necessary to intensify efforts and to draw up simple methodologies applicable in the Latin American context. In addition, most of the information refers to evaluation studies carried out at the production stage, where the agricultural researcher usually is not involved. It would be advisable to study strategies that incorporate the researchers to a greater degree in the evaluation of their technological results at the dissemination stage as well as at the production stage.

In conclusion, most of the literature reviewed can be classified as ex post evaluation of the technological impact, in other words, the effect of research results once they have been adopted. There are many gaps in ongoing evaluation, such as the monitoring of research execution and the evaluation of technical and scientific results before they are disseminated. Research evaluation, as a new activity, has a broad scope for action. The review of literature for the region has shown what a very preliminary stage it is at and what its strong and weak points are. The analysis of information has permitted a most realistic diagnosis about this function. To study this topic in greater depth, however, requires more advanced studies in fields where material already exists, initiating studies on areas where materials are lacking, intensifying the exchange of experience among the few technicians already involved in this type of activity, and encouraging greater discussion on how to evaluate. These are aspects on which agreement exists among several research leaders in the region consulted during this study.

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Organization and Implementation

Evaluation in the Malaysian Agricultural Research and Development Institute

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The Malaysian Agricultural Research and Development Institute (MARDI) is responsible for agricultural research for all crops (except rubber and oil palm) and livestock. MARDI has established procedures for ensuring maximum quality and effectiveness of its research programs through a Governing Board, Scientific Council, Advisory Committee, and a Project Monitoring and Research Management Committee. In addition, research programs are also evaluated through workshops, seminars, and conferences and through internal as well as external reviews.

The need for and value of evaluation is well recognized and accepted by all levels in the organization. A centralized and integrated planning, monitoring, and evaluation system is being developed to enhance the performance of the institute and is linked to the national system. A comprehensive monitoring and evaluation system including the evaluation of scientists is being pursued.

The Malaysian Agricultural Research and Development Institute (MARDI) was set up by an Act of Parliament adopted in 1969. It was conceived as a multidisciplinary, problem-solving, agricultural research organization for Malaysia taking over the agricultural research functions and facilities that had been the responsibility of the Department of Agriculture. The integration of all agricultural research, except rubber, into MARDI was looked upon as a way to bring together in one organization all of the scientific skills and capabilities needed to do effective research on agricultural problems. MARDI would also provide the organizational base for the nationwide, problem-oriented, interdisciplinary research system required to furnish the essential new technology for diversification and intensification of the agricultural sector. MARDI became operational in 1971, and is responsible for conducting research with respect to the production, utilization, and processing of all crops (except rubber and oil palm) and livestock.

After 15 years, it is time that the achievements of MARDI be made public and determine how successful it has been in fulfilling its functions and meeting its objectives. Before the answers can be provided, the question must be asked as to whether any monitoring and evaluation (M&E) has been done in MARDI and whether any formal system exists for M&E. Consequently, these are the issues that are presented in this paper.

Monitoring and Evaluation — Past Experience

The functions of M&E are related but distinguishable. Monitoring is an internal activity and is an integral part of the day-to-day management. It involves the management to assess the progress of implementation and make timely decisions to ensure that progress is maintained according to schedule. Evaluation assesses overall effects and their impact. It involves the collection of relevant, timely, and objective findings and making specific recommendations on performance, thereby improving the information base on which decisions are made.

Since its inception, MARDI has never formalized or institutionalized the roles and functions of M&E. MARDI, however, has established built-in procedures for ensuring maximum quality and effectiveness of its research programs:

- The *Governing Board (GB)*, as outlined in the MARDI Act, determines, among others things, the policies and approves the budgets with respect to the operations of the Institute and allocates grants-in-aid for research to be conducted by other organizations. The GB is made up of members from the various government ministries and agencies as well as members with experience in agricultural research or agricultural development. The Board meets four times a year.
- The *Scientific Council (SC)* is also included in the MARDI Act and offers advice on the formulation and review of research programs and on priorities for research and development (R&D) programs. The SC includes members from universities and relevant agencies as well as eminent persons from the agricultural industry. The Council also meets at least four times each year.
- *Advisory Committees (AC)* assist and advise the SC on the priorities and framework for research. They

also evaluate the research activities and achievements and advise the SC on the needs of commodity and disciplinary research. They meet two or three times a year.

- For *Project Monitoring (PM)* a panel of research division directors meets once a year to review the implementation of research projects. The monitoring exercises have been looking at the strengths and weaknesses of ongoing projects and decisions can be made to terminate some of them. This exercise strengthens the AC mechanism and provides advisory functions where there are no committees.
- The *MARDI Research Management Committee (MRMC)* includes all division directors. The Committee meets twice a month with the Director General to decide on research and administration policy matters.

In the foregoing procedures, only the PM exercise provides a forum for an interface between the reviewers and the implementors of research projects. A dialog is possible during these sessions, and both parties benefit from the views and comments presented. The SC and AC generally provide broad directions and priorities for research. The MRMC considers the views of the SC and AC and translates them into action plans, and decisions are made to direct and facilitate the implementation of research activities.

In addition, MARDI also initiated evaluations of its research programs and technologies through workshops, seminars, and conferences; internal, special, and impact studies; and external reviews. MARDI organizes both national and international workshops, seminars, and conferences on specific commodities or areas of research. MARDI scientists also participate in both local and international meetings. At these fora, the progress of ongoing research and the findings of completed research and resultant technologies are presented and discussed. The views and comments obtained have been effective in identifying weaknesses and strengths and in guiding future research.

For the internal, special, and impact studies, from time to time, MARDI researchers carry out a number of ex ante and ex post studies on various commodities to assess the benefits of present and potential technologies. These evaluations are useful in determining the viability of technologies, in identifying the problems and extent of technology adoption, and in justifying resource requirements for technology development. A notable study carried out in 1980 determined the financial resource allocation to research for different commodities in MARDI. It provided a data base for a more rational system of resource allocation in the future as well as a basis for future studies on benefits to research. A task force was formed in 1983 to establish research priorities among commodities entrusted to MARDI. This was followed by another review in 1984 to determine the priority areas of research and the various strategies to be adopted for each commodity or areas of research that concerns MARDI. This exercise indicated the priorities and optimal allocation of research resources by projects, programs, and commodities; ensured that research projects are not planned in bits and pieces but formulated in a cohesive, comprehensive manner based on a multidisciplinary research approach geared toward developing complete packages of technology; and indentified a clear mission for the research scientists to follow making them accountable to the research responsibilities.

External reviews have been conducted (a) to determine the relevance of research activities to meet national needs, (b) to assess and determine scientific manpower availability and requirements, and (c) to indentify training needs, in connection with the World Bank loan. Short-term foreign consultants usually are appointed for the reviews. Reviews and appraisals have been conducted on specific commodities as well as on disciplinary research programs. These reviews are both ex ante and ex post and involve the researchers, the research managers, as well as the clientele of the research output. In most cases, the reviews tended to endorse or identify new directions of research to existing plans and to reconfirm the need for specialist-trained manpower. One drawback of these exercises is the lack of dissemination of the findings of the reviews to the relevant parties involved.

In addition, two reviews were conducted to look at the whole MARDI organization. The findings of the second formed the basis for the reorganization of the MARDI structure and subsequent decisions regarding the formulation and implementation of research and the redeployment of manpower and other resources.

Planning and Evaluation — Present and Future

The existing MARDI structure as shown in Fig. 1 emphasizes applied research on a commodity basis. Commodities are prioritized based upon their potential and prospects, area and value of production, value of imports and exports, number of producers involved, and the "political" characteristics of the commodities. Each commodity or group of commodities is organized as a division and staffed with the full complement of scientists of various disciplines. These commodity research divisions are responsible to a Deputy Director General (DDG). Another DDG is charged with the responsibility of coordinating research support services and development. The rationale is that some specialized research disciplines

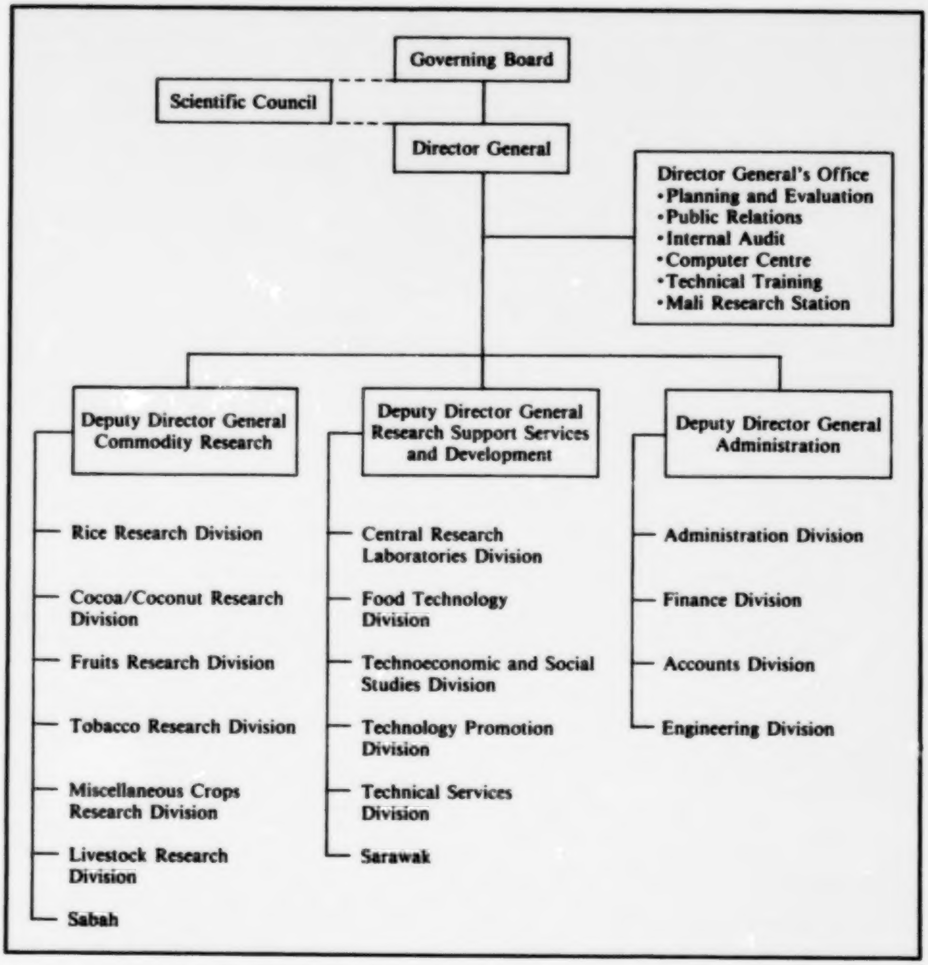
Governing Board
Scientific Council
Director General
Director General's Office
•Planning and Evaluation
•Public Relations
•Internal Audit
•Computer Centre
•Technical Training
•Mali Research Station
Deputy Director General Commodity Research
Deputy Director General Research Support Services and Development
Deputy Director General Administration
Rice Research Division
Cocoa/Coconut Research Division
Fruits Research Division
Tobacco Research Division
Miscellaneous Crops Research Division
Livestock Research Division
Sabah
Central Research Laboratories Division
Food Technology Division
Technoeconomic and Social Studies Division
Technology Promotion Division
Technical Services Division
Sarawak
Administration Division
Finance Division
Accounts Division
Engineering Division

Fig. 1. The Malaysian Agricultural Research and Development Institute (MARDI) organizational structure.

as well as expensive and sophisticated equipment and facilities need to be pooled for efficient utilization. Moreover, technologies developed by the commodity divisions also need to be marketed as a package, and follow-up services to the extension agencies and final consumers require continuity and persistency. MARDI believes that the commodity divisions should concentrate on developing and producing the technologies. Administration, finance, accounts, and engineering services are further grouped under a third DDG.

Recognizing the value and benefits to be gained from evaluation, a unit was created to assist the Director General (DG) in Planning and Evaluation (P&E). This unit is responsible for coordinating and providing the secretariat for the overall P&E in the Institute.

A formal system of P&E is being developed giving consideration to the following:

- P&E is an integral activity and facilitates decision-making in management;
- P&E at the Institute level should be consistent with and linked to P&E at the national level;
- Acceptance by administrators of the management implications of evaluation and its acceptance as an integral part of R&D management by scientists;
- Evaluation is oriented toward meeting user needs and, therefore, to utilization;

- The level of resources allocated to evaluation is kept modest so that the evaluation activity does not cost more than the initial research activity;
- Emphasis on ex ante evaluation and monitoring (otherwise ex post evaluations would continue to support the notion that "research is good and more research is better");
- Perspective is better than objectivity;
- Evaluation is a useful way of expanding corporate memory through experience and providing guidance for planning; and
- Continuous communication (for evaluation must be seen as part of the process of R&D and, hence, upon interaction, iteration, and integration).

As shown in Fig. 2, MARDI envisages the following procedures in P&E.

Corporate Plan

At the Directorate, a Corporate Plan (CP) is developed with the participation of division heads based on national needs as expressed in various documents such as the Outline Perspective Plan (OPP), the Five-Year Development Plan (FDP), the National Agricultural Policy (NAP), and the Industrial Master Plan (IMP). The CP establishes the corporate objectives and strategies and identifies the research programs and broad projects as well as the long-term resources requirement in terms of finance and manpower. The CP is submitted to the GB, SC, and the Ministry of Agriculture (MOA) for approval. It is also reviewed annually to build up a 5-year rolling plan. The CP is the basis for requesting the 5-year development budget.

Action Plan

The divisional heads are responsible for developing the Action Plan (AP) annually with the involvement of research scientists and guided by the CP as well as views from the users of technology. Economic and social assessment may also need to be undertaken. The AP sets out specific objectives and strategies and identifies projects and experiments to be carried out. It also indicates the actual financial and manpower resources required to implement the plan. At the end of each year, the Directorate carries out ex ante appraisals and ex post evaluations on the programs and projects in the AP. It then becomes the basis for the annual budget request. Every 2 or 3 years an external review is done on the programs and projects by experts and eminent scientists, both local and foreign. At the operational level, the division heads monitor the progress of the AP every 4 months, and the progress reports must be submitted to the P&E unit. The P&E unit highlights strengths and weaknesses of the plan and passes this information on to the Directorate for action. A term progress report on the programs including information on financial and manpower utilization is also submitted to the GB, SC, and MOA. The reporting system is linked to the reporting requirement of the MOA, which in turn is in line with the national M&E system.

Local Verification Trial/Pilot-Scale Testing

Technologies developed at experimental stations and laboratories are verified under actual farmers' environments or for commercial viability with the involvement of development and extension agents and users of technologies. Only after the scientists (including economists) are certain about their viability and appropriateness can the technologies be disseminated. A report outlining the packages or component technologies successfully developed would be submitted for consideration by the Directorate. In instances where MARDI adopts or adapts technologies from other sources, the Local Verification Trial (LVT) and Pilot-Scale Testing (PST) would be carried out on these technologies before they are disseminated.

Technology Impact Studies

Following the adoption of new technologies, Technology Impact Studies (TIS) would be carried out by MARDI scientists with the cooperation of development and extension agents to assess weaknesses or successes of technology adoption. The lessons and experience gathered would be used for subsequent P&E.

The process as outlined is by no means one way. A two-way communication is being practiced for effective planning. Furthermore, the M&E findings would be disseminated to all relevant and interested parties.

The implementation of the foregoing procedures would be enhanced by the system of management through meetings, which is being institutionalized as directed by the MOA. The system involves management meetings of various levels at regular intervals adopting a standard agenda:

- The MRMC now meets twice a month;
- The Division Management Committee includes coordinators, heads of stations, and administrative officers of the division and meets once a month; and
- The Station Management Committee includes the farm manager and representatives of each of the divisions deployed at the station and meets once a month.

Conclusion

Past experiences in evaluation indicated that general evaluation has been carried out by MARDI. Ex ante, ongoing, and ex post evaluations have been

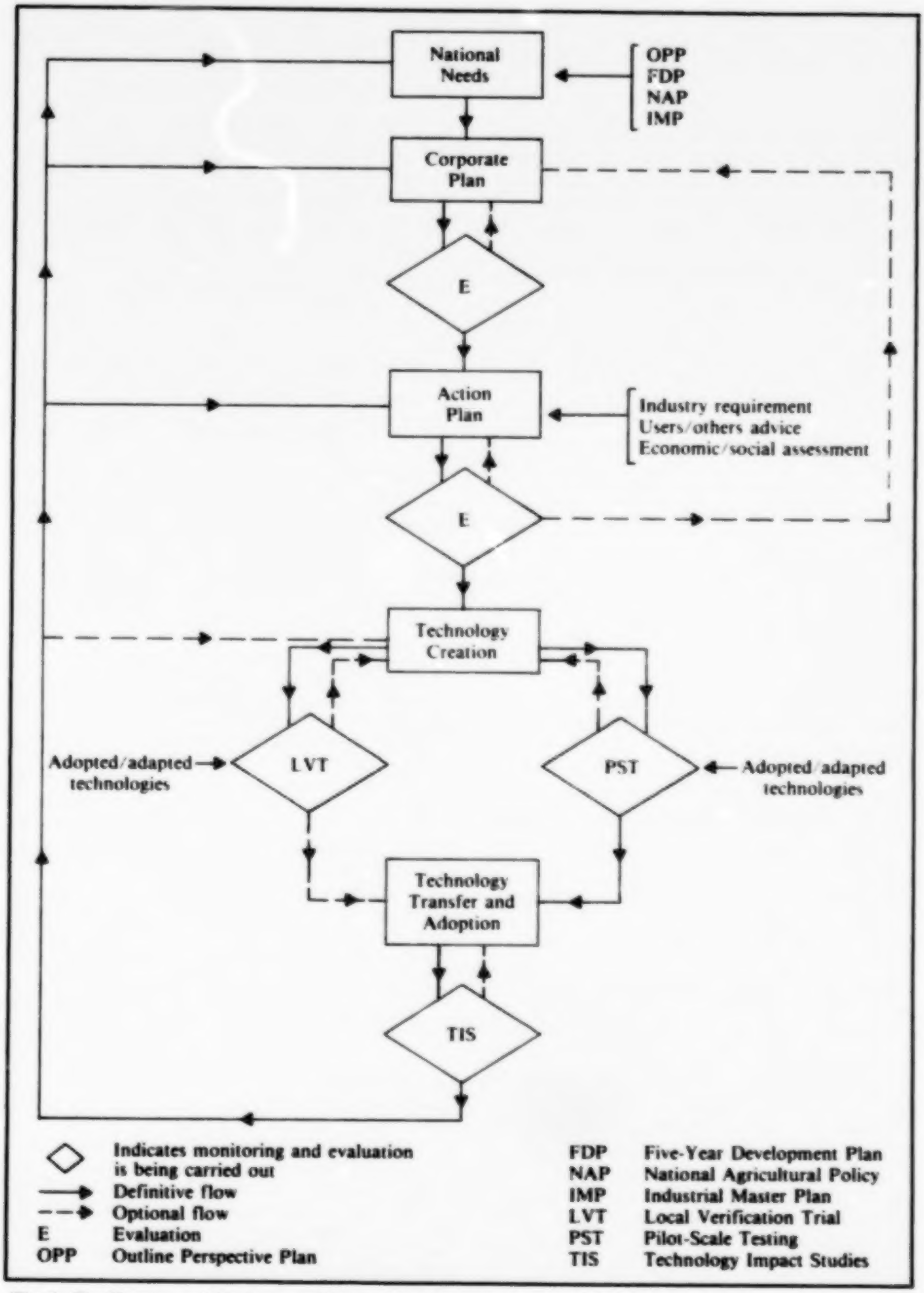
National Needs
OPP
FDP
NAP
IMP
Corporate Plan
E
Action Plan
Industry requirement
Users/others advice
Economic/social assessment
E
Technology Creation
Adopted/adapted technologies
LVT
PST
Adopted/adapted technologies
Technology Transfer and Adoption
TIS
Indicates monitoring and evaluation is being carried out
Definitive flow
Optional flow
E Evaluation
OPP Outline Perspective Plan
FDP Five-Year Development Plan
NAP National Agricultural Policy
IMP Industrial Master Plan
LVT Local Verification Trial
PST Pilot-Scale Testing
TIS Technology Impact Studies

Fig. 2. The Planning and Evaluation (P&E) model of the Malaysian Agricultural Research and Development Institute (MARDI).

applied at various levels of research, i.e., project, program, discipline, or commodity. Even institutional evaluation has been done. Both internal as well as external reviewers have been involved in carrying out these evaluations.

More recent experiences in evaluation have involved mainly internal participants ranging from the DG to the research scientists. These evaluations have been useful in strengthening the management capability of the organization as well as in providing clear directions and definite priorities in the implementation of R&D. Equally important is the acceptance of the need for and value of evaluation by both management and scientists. Neither group feels that the evaluation is imposing authority or stifling creativity but rather that it enhances more efficient performance.

A significant finding of these evaluations is to reaffirm the need for a centralized P&E system in an organization as large and multidisciplinary as MARDI. Another finding is the recognition of the importance of developing and, if possible, integrating an objective system of evaluating scientists into a comprehensive M&E system.

Evaluation in the Indian Council of Agricultural Research

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This paper reviews the current agricultural research evaluation system in the Indian Council of Agricultural Research (ICAR) with respect to its effectiveness and utilization of the results of such evaluation in improving the research system. The present evaluation system at the level of the research institutes, which involves maintenance and evaluation of project files, evaluation and approval of projects by the Staff Research Council, broad based decision-making through management committees, and the institution of coordinated research projects and their evaluation system, is more recent in origin in the ICAR system. The data for the study were acquired through questionnaires, interviews, and reports from various committees.

ICAR is an autonomous registered society with the objectives of undertaking, aiding, promoting, and coordinating agricultural and animal husbandry research, education, and transfer of technology and to undertake consultancy service. A national evaluation system exists and the responsibility lies primarily with the ICAR headquarters. Project coordinators and the directors of the research institutes also play an important role in research evaluation with respect to their projects and institutes. The ICAR headquarters has a few specialized units in addition to the subject matter divisions to undertake the evaluation.

All three categories of research evaluation, ex ante, monitoring, and ex post, are carried out. All the projects are evaluated and there is no selection. Primarily, the effectiveness of the implementation of the technical program and achievement of the objectives are considered in evaluation and very little attention is paid to efficiency (cost benefit ratio) and impact. The evaluation is essentially in the form of peer review based on personal discussions, presentations, and examinations of reports. Only in a few cases have specific questionnaires been prepared and utilized in evaluation. The evaluation findings have been utilized for restructuring the system in terms of adding new institutes/other research units and projects and redefining the mandates of different research units and making changes in their programs and structure. The evaluation does keep in view the achievements in relation to the mandates and inputs and to the extent that the results have been utilized or are likely to be utilized.

Based on the information from the institutes, inferences on the availability of research monitoring support, maintenance of research project files (RPFs), effectiveness of these files in research evaluation, and the effectiveness of staff research councils (SRCs) quinquennial review teams (QRTs), and individual scientist's evaluations for career advancement were drawn and are presented separately for national and other institutes. Similarly, based on the responses of heads of divisions (HD), the effectiveness of these systems of research evaluation at the institute level was determined. Evaluation of other projects, for example, foreign-aided, bilateral cooperation, etc., was also conducted and details of such evaluations are presented.

The report presents the organizational structure of the Indian Council of Agricultural Research (ICAR); brief objectives of the different units; the systems of research planning and monitoring at the level of the Council, institutes, and at the project level within institutes; the All India Coordinated Research Projects (AICRPs); ad hoc schemes; and a number of other projects funded by ICAR and those implemented as bilateral cooperative/foreign-aided projects. An evaluation is also made of each component of the system, the type of evaluation, the methodology used, evaluations actually carried out, their utilization in improving research systems, weaknesses in the present evaluation system, and suggested changes.

Indian Council of Agricultural Research (ICAR)

The agricultural research system in India includes some 27 500 scientists, which makes it possibly the largest such system in the world. ICAR with its 40 institutes, 6 national research centres, 6 project directorates, 4 bureaus and the National Academy of Agricultural Research Management (NAARM), and 23 agricultural universities makes up the major organizational set up for agricultural research in the country. ICAR is the main organization and is autonomous but is subjected to statutory audit and scrutiny by Parliament. Major funding is from Government of India grants, from the Agricultural Produce (AP) Cess Fund, and from foreign assistance. The Council aims at undertaking, aiding, promoting, and coordinating agricultural and animal husbandry research and education; acts as a clearinghouse for information; establishes a research and reference library; and is involved in the transfer of technology programs and consultancy.

National Evaluation System

ICAR headquarters is responsible for undertaking evaluation and coordinating research programs in the Council. In addition, the directors of the institutes, bureaus, and national research centres and the project coordinators/directors evaluate the program of their respective units and projects.

There are detailed procedures for the evaluation of research in the ICAR system. The Council has been reviewed a number of times involving national and foreign inputs and including ex ante evaluation. The responsibility of ex ante evaluation of all the new programs at the Council level starts at the formulation of the Five-Year Plans.

Planning Commission Steering and Working Groups

At the time of formulation of the Five-Year Plans, the Planning Commission forms a steering group on agriculture including other related sectors under the chairmanship of the Union Minister for Planning and the Deputy Chairman of the Planning Commission to identify specific working groups and task forces to undertake in-depth studies on the problems by working out proposals in different sectors; developing guidelines on approaches, strategies, objectives, and targets of agricultural development; and making suitable recommendations to the Planning Commission. The steering group in turn forms several working groups, one of which is on agricultural research and education under the chairmanship of the Director-General of ICAR and the Secretary, Department of Agricultural Research and Education (DARE) in the Union Ministry of Agriculture. The working group then develops subgroups on different major activity areas such as crop sciences, animal sciences, fisheries, education, transfer of technology, etc.

Organization and Functions of ICAR

The ICAR headquarters plays a major role in project planning and evaluation. The ICAR headquarters currently has 84 scientists out of a total of 6500 scientists in the system and spent INR 189 million out of INR 5204 million (12 Indian rupees [INR] = 1 United States dollar [USD]) spent on the Council during the sixth plan. ICAR directly administers research institutes, bureaus, national research centres, and project directorates. In addition, it has a large national network of multilocational and multidisciplinary AICRPs. ICAR also funds ad hoc research schemes out of AP Cess Funds and U.S.-Held Rupees (Public Law-480) and administers foreign-aided projects. It also supports research through establishing chairs of professor of eminence, national fellowships, and emeritus scientistships.

ICAR is headed by a Director General (DG), who is also Secretary to the Government in the DARE. On technical matters the Director is assisted by the five subject matter divisions: crop science, soils, agronomy and agricultural engineering, animal sciences, and education and transfer of technology, each headed by a deputy director general (DDG). The DDGs are assisted by the assistant directors general (ADGs) and senior scientists. At headquarters there is a Plan Implementation and Monitoring Unit (PI&M) headed by the ADG (PI&M); a Project Implementation Unit (PIU) primarily related to U.S.-assisted projects, also headed by the ADG (PIU); and the unit related to centre-state relationships headed by an ADG (Cdn). There is also a PIU to monitor the United Nations Development Programme (UNDP) assisted projects under the supervision of DDG (Education) who is the National Project Director. The administrative and technical wings have reasonably independent responsibilities. The technical side provides only technical support and is not involved in administration or financial matters.

There are scheme sections to provide administrative and financial support to the ADGs. Similarly, in support of the administrative wing, there are external establishment units that deal primarily with the institutes. There is a clear dichotomy between the technical and external establishment units. The external establishment units report directly to the Secretary and DG of ICAR on all matters.

Institutes

The DG is directly responsible for the national institutes: National Dairy Research Institute (NDRI), Indian Veterinary Research Institute (IVRI), Indian Agricultural Research Institute (IARI), and NAARM, where the DDGs are responsible for central institutions, national research centres, and bureaus on technical aspects. The institutes send proceedings of the SRCs, research project files, and annual reports to the Council. The institutes also send fortnightly and monthly reports for the Cabinet on their major achievements. Usually, the proceedings of SRCs are not received and the annual reports may only come in July for the preceding year. These proceedings and reports are evaluated by ICAR headquarters; the system, however, is not very effective. ICAR headquarters staff also visit the institutes from time to time, and through formal and informal interaction help in evaluating the institute research programs and give broad suggestions for their improvement. Efforts to get the evaluation of ongoing research programs reported in an effective manner have not been successful. The management board/committee, of the institute is also expected to play a role in research evaluation but, again because of time and the system of bringing the research programs and their evaluation to the notice of the board or committee, it cannot be effective. In the whole system of research evaluation, the role of ICAR headquarters in project evaluation is perhaps the weakest.

AICRPs

The coordinated research projects are looked after by full time project coordinators. The project coordinators are located in the ICAR institutes/agricultural universities and are provided with a coordinating unit of some scientific, technical, and administrative support to help in project monitoring. ICAR headquarters also plays an important role in the monitoring of the coordinated research projects and the ADGs and senior scientists at the headquarters look after monitoring and evaluation. The project coordinators are responsible for technical matters to the concerned DDG and administratively to the directors or vice-chancellors depending upon their location.

AP Cess-Funded Ad-Hoc Schemes/NARP

The ad-hoc schemes funded out of AP Cess Funds are evaluated and monitored by scientific panels with ADGs/senior scientists as member secretaries and other senior scientists drawn from the country's research system as chairmen. ICAR at present has 21 such panels.

With the International Development Association (IDA) soft loan of USD 27.0 million, half of the expected expenditure on the project, ICAR has launched a National Agricultural Research Project (NARP) to permanently strengthen the capabilities of the state agricultural universities (SAUs) to conduct location-specific, production-oriented research in the agroclimatic zones identified in their service areas. This is done in an effort to reform the existing university-based agricultural research to concentrate primarily on research oriented toward a particular agroecological zone. The SAU prepares a background paper on research needs and available facilities. After the approval of the background paper by the Project Funding Committee (PFC), a team of experts is appointed by the Council to review the research needs of the state, existing research support, present activities, and proposed rationalization and strengthening measures indicating the location of substations and their functions.

The PFC approves the research review report on the recommendations of the Interdisciplinary Scientific Panel (IDSP). On the basis of the recommendations of the research review committee, the SAUs prepare subproject proposals, which are evaluated by a team appointed by the Council. The PFC approves the subproject on the recommendations of IDSP and Finance Division.

The monitoring of the project is done through annual visits of the project unit of ICAR and visits by the World Bank supervision mission (every 6 months) with the ICAR representatives to some selected stations. A 6-month report of each subproject and a seasonal summary of research results is also submitted. After 2 years a project report is submitted and after 5 years a final report is submitted. These reports are used for monitoring and evaluation of the subprojects.

UNDP Centres for Advanced Studies

Proposals are invited on identified areas and after examination at the ICAR headquarters they are forwarded through the Department of Economic Affairs to the UNDP for appraisal. The main purpose of these projects is to strengthen the teaching and research competence of an institute or SAU in a certain area identified because of strength and according to the requirement. The project is monitored by the implementation unit under the DDG (Education) of ICAR. Each subcentre has an advisory committee that meets at least once a year to formulate programs and monitor progress. Monitoring is also done through personal visits of project directors and unit staff. There is a project working committee that also monitors the progress of these projects.

U.S.-Held Rupees (Public Law-480 Projects)

Project proposals are received from individual scientists through a sponsoring institution. The proposals are examined by the Foreign Aid Section (FAS) and then referred to external referees. These schemes are considered by the scientific panels and processed through the Finance Division. These are then submitted to the Ministry of Agriculture Screening Committee (MASC) for approval and are then sent to the United States Agency for International Development (USAID), which appoints counterpart scientists. After approval by USAID, the formal sanction of the project is issued.

Foreign-Aided Projects

Most of the project proposals are formulated at ICAR headquarters in consultation with the participating institution. In some cases, consultation with foreign experts, funding agencies, or counterpart scientists of the bilateral cooperating country through a visit to the participating institution in India helps in detailed formulation of the project proposals. The proposals are then examined at the Council's headquarters both from the technical and from the financial angle and after government clearance they are sent to the donor agencies or bilateral cooperating country. These schemes are regularly monitored by special committees appointed for this purpose.

Formal Policy of Evaluation of Projects

Council

Working Group on Agricultural Research and Education

The Planning Commission Working Group on Agricultural Research and Education is made up of several subworking groups. These groups critically review the achievements in the previous plan and suggest proposals for implementation in the current plan. The subgroups review the progress of ICAR institutes, coordinated projects, bureaus, national research centres, etc., in their sector with respect to their performance, infrastructural development, staff strength, and expenditures.

These groups follow the recommendations made by the QRTs mid-term appraisal committees (MTAC) and special groups formed by ICAR. The report of the Working Group is then submitted to the Planning Commission for consideration by the Steering Group.

Institutes

Quinquennial Review

The quinquennial review (held every 5 years) is a tripartite review involving institutes, ICAR headquarters, and an expert group drawn primarily from outside the system. Its major responsibility is to examine the activities, scope of the research programs, and budget allocations of the institute over the past 5 years and to examine plans for the next 5 years in relation to overall national plans, policies, and long- and short-term priorities and identify the research achievements with special reference to the use to which the results have been put or are expected to be put.

Institute's/Divisional Staff Research Councils

The institute's research programs are evaluated and approved by the SRCs. In the case of the national institutes, there also exist divisional SRCs. Generally, only the senior scientists are represented on the institute research council. Some institutes have developed innovative mechanisms in addition to the established procedures to do evaluation of the institute research projects. The institute and divisional SRCs are expected to meet quarterly and review the progress of ongoing projects. The annual SRC meeting considers, in addition to the monitoring of the ongoing research projects, new research projects and makes decisions on phasing out projects and approving new projects and modifications to the technical programs of the ongoing research projects if required. For the purpose of research evaluation and monitoring, each institute is provided with a small technical section that assists the Director.

Institute Management Boards/Committees

In addition to the SRC, the institute management boards or committees look into the research programs and allocation of funds. They are expected to meet quarterly.

ACIRPs

The ACIRPs are subject to regular monitoring by the Project Coordinator and by ICAR headquarters and are reviewed at an annual workshop. The workshops are attended by project scientists, ICAR headquarters staff, and experts drawn from ICAR institutes and agricultural universities. The workshop evaluates the work done in the previous year, draws up a work plan for the next year, and reviews the implementation of recommendations made at the previous workshop. In addition, the coordinated projects are evaluated periodically by mid-term appraisal committees.

AP Cess-Funded Ad-Hoc and Foreign-Aided Schemes

In the case of AP Cess-Funded Ad-Hoc Schemes, elaborate guidelines for the implementation of the project cycle have been established by the governing body of the Council. The projects are received either from individual scientists or are prepared as model schemes by the scientific panels based on identification of national research priorities that could not be accommodated as plan schemes. The schemes, in addition to being studied by the Member Secretary, are sent to two external referees. Their comments are then considered by the panel. The panel also monitors progress and evaluates the final report. For foreign-aided projects, there is a formal policy of evaluation that includes the initial appraisal by an expert team involving the cooperating-country and subsequent evaluation from time to time by expert teams involving donor agencies.

U.S.-Held Rupee (Public Law-480) Schemes

The U.S.-Held Rupee Schemes are processed in a similar manner to the ad-hoc schemes. After recommendation by the scientific panels and finance they are considered by the MASC. After approval by MASC, the proposal is cleared from security and sensitivity angles and then forwarded to USAID through the Department of Economic Affairs (DEA). It is then examined by a U.S. expert (who is later named as a counterpart scientist) for technical aspects and initiated only after clearance by USAID. The progress of these projects is monitored by scientific panels on the basis of annual reports and final reports are also evaluated by the panels. The U.S. counterpart scientist also comments on the annual and final reports.

Evaluation of National Projects, Programs, and Findings

Categories and Levels of Evaluation

All three kinds of evaluation are done: ex ante, monitoring, and ex post. Ex ante analysis is done before funding is approved. The implementation of the project is monitored periodically, however, because most of the projects are long term there is not much ex post evaluation. *System-wide evaluation* has been done from time to time but is regularly done at the formulation of the 5-year plans by the planning commission steering group, working groups, and the various subgroups. *Evaluation of the institutes* is done by the ICAR headquarters subject matter divisions as well as every 5 years by QRT. The proceedings of the SRC meetings and the annual reports are sent to the subject matter divisions for evaluation; this however, is not being done effectively. The ICAR headquarters senior staff members also visit the institutes either to participate in the management committee meetings and attend SRC meetings or to discuss the ongoing research projects. Individual projects are subjected to scrutiny by the SRC at the divisional or institute level or both and the Council is expected to meet every quarter.

Evaluations Undertaken

The major emphasis in evaluation of research projects in the institutes in particular and in other projects in general is on effectiveness. Very little emphasis is laid on efficiency. No serious calculations of funds required for each project are attempted and given in RPFs. Similarly, very little impact analysis of the project is done, although the major mandate of the QRT is to examine and identify the research achievements of the institute with special reference to the use to which the results have been put during the last 5 years or are expected to be put and in particular to determine whether the achievements are commensurate with the overall expenditure incurred. There is no evaluation of the effectiveness of the staff in accomplishing individual goals. Rather, in the majority of cases, the responsibilities assigned to individual scientists who are associated with the project are unclear.

For coordinated projects, ex ante evaluation of the projects was done at the time of formulation. Some evaluation of the kind is also done at the formulation of the 5-year plans. Monitoring of these projects is being done by the Project Coordinator at ICAR headquarters and at the annual workshop from time to time. These projects have been subjected to a review by external teams (MTAC). Ex post evaluation has been attempted on completed projects. Even in the case of the coordinated research projects, the major emphasis is on effective implementation of the technical program rather than on the efficiency of its implementation or impact arising from project results.

Evaluation Centres

The responsibility of carrying out the evaluation is primarily with the ICAR headquarters servicing scientists, project coordinators, and directors of the ICAR institutes, although in the case of foreign-aided projects, foreign consultants and agencies are also involved. At the institute, the management committee and the SRC at the divisional or institute level are responsible for carrying out evaluation. The Project Coordinator and the subject matter divisions at the ICAR headquarters are responsible for coordinated projects. In the case of the ad-hoc schemes, the Member Secretary of the Panel and the Scientific Panel are responsible for evaluation.

Criteria and Methodologies

All the projects and programs are subjected to evaluation, there is no selection of projects or programs for evaluation based on their size or any other consideration. The QRTs evaluating the research institutes, however, generally confine their reports to the major programs or objectives of each of the divisions and do not comment on each individual research project and the contribution of each research scientist.

The methodology generally adopted in evaluation of the research activities of the institute projects is through discussions with the scientists by the QRT members as far as QRT evaluation is concerned and by peer review in the case of the individual research project evaluated by the SRC of the institute. In the case of the coordinated project and ad-hoc AP Cess-Funded and Public Law-480 projects, the evaluation is essentially through peer review.

Evaluation Findings and Uses

The number of evaluations carried out in the last 5 years is too large to allow discussion of each of these evaluations. Similarly, it is not possible to estimate the expenditure incurred through different evaluations. In general, the evaluations have been directed toward the relevance of the objectives and priority research areas considering the national priorities and developments in the total agriculture research system and whether the activities and output of the programs/projects are in line with the current mandate of the various units. On the basis of research evaluations at various levels and by different defined agencies, including those by ICAR headquarters, major changes in the mandate, programs, and organization of the infrastructure have been brought in to the institutes and coordinated research projects. Changes in the objectives and technical programs and the addition or dropping of research centres have also been done in the case of coordinated projects. Similar changes in technical programs have been made in other projects wherever warranted.

Effectiveness of the Current Evaluation System

There is a technical section to help in research project evaluation and maintenance of the project files in almost all of the institutes. In central institutes, there is usually one support person and in the national institutes there are 2.5 technical support personnel. On average, two meetings of the SRCs per year have been held during the last 5 years in the central institutes and 2.5 have been held in the national institutes. At the central institutes, an average of 70 projects were progress monitored, 18 were evaluated for final results, and 24 new proposals were considered, giving an overall total of 112 projects. These SRC meetings were held on an average for 3 days with some 37 projects to be considered each day, which does not allow satisfactory time for thorough evaluation. Similarly, the national institute meetings monitored the progress of 183 projects, considered 48 final reports, and 65 new project proposals for a total of 296 projects giving an average of 31 projects considered each day, which is also insufficient to allow proper evaluation.

There was participation of outside experts only in one-third of the SRC meetings in the central institutes and one-half of the meetings in national institutes. The SRC in evaluating research projects was considered 100% effective in national institutes and 84% effective in central institutes. The research project files were maintained properly and gave clear definition of the responsibilities of the associates but not as much information on the activities to be conducted during the year. The research files were effectively evaluated by the project leader, head of the division, and the director and their comments were recorded and communicated. This, however, is not correct as the majority of project files examined by the author of the institutes under his charge were not complete and, except for the signatures of the head of the division and the director, there was no evaluation recorded. There is also no requirement in the RPF proforma for such evaluation. The majority of institutes reported few constraints in the maintenance of research project files except inadequate staff in the research monitoring unit, delay in the receipt of the reports from the scientists, and inadequate and incomplete information provided by them. The RPFs are currently not being effectively used as a measure of research project evaluation.

Although it is indicated that QRTs evaluated the research programs of the institutes for effectiveness, efficiency, and impact, most of the respondents did not clearly understand the type of evaluation. Most of the evaluation was for the effective implementation of the technical program and little was done in terms of efficiency and impact because the basic information on the expenditure on each project was not maintained and the impact that the research made in the overall improvement of production/productivity in the country could also not be evaluated. The QRT recommendations were utilized in almost all cases to make necessary changes to the program and the structure of the institutes. The respondents suggested that there may be five to seven members of the QRT representing major disciplines falling within the institute's mandate. The review should be done every 5 years and major programs as well as individual research projects should be evaluated. The evaluation of the individual scientists for their career advancement shows that 63–65% were promoted in the last 5 years and another 24–34% were awarded advance increments making almost 90–97% being judged as having done very well.

Division Heads in Institutes

Based on the response of the heads of divisions on the research evaluation system, 50% of the time the ideas for a new research project were conceived by an individual scientist and a group of cooperating scientists formulated the research project. The basic criteria for choosing the project were the importance of the problem followed by the facilities available. The research project files were maintained with the proper definition of the responsibilities of individual scientists, giving adequate time and physical targets.

The heads of divisions evaluated the projects through interaction with the scientists, examination of the reports, and visits to the experimental fields and laboratories. The annual reports of the projects were evaluated by the project leaders and heads of the divisions, and these evaluations were referred to in the annual assessment of the scientists. The type of evaluation done was essentially on the effective implementation of the technical program. The SRC was considered effective by only 56% of the heads of divisions, whereas the directors considered the SRC to be very effective. The major reasons for ineffectiveness were too many projects discussed, shortage of time, and inadequate interaction among the scientists. It was suggested that SRCs should be more disciplined and should include the participation of outside experts. The SRCs should be held every 6 months and their recommendations should be mandatory.

Regarding the effectiveness of the QRT, the respondents indicated that they were well satisfied with the interaction with the QRT. The QRT evaluated overall programs in terms of their effective implementation and the impact that they have made. The scientists were satisfied with the utilization of the QRT recommendations and felt that their opinions have been considered in the formulation of the recommendations by the QRT. The coordinated projects are evaluated by the Project Coordinators, ICAR headquarters' scientists, and the annual workshops.

Project Coordinators

The response of the Project Coordinators with respect to the effectiveness of the research evaluation indicated that there is effective monitoring of the coordinated projects through the visits of the Project Coordinators to the units and through annual workshops. Most of the evaluation is done on the effectiveness, although efficiency and impact have been considered in terms of the methodology used and peer review was used in evaluation. The only constraint in evaluation was the delay in the submission of the reports. To make the evaluation of the total project more effective, it has been suggested that the Project Coordinating Units be strengthened and the MTAC review of the work of the project be done every 5 years before the formulation of the 5-year plan proposals.

The Project Coordinators usually visited each centre once a year and communicated their observations to the centre. On average, one workshop was held each year except on some new projects. The recommendations made at the workshops were fully implemented and so were the recommendations of the MTAC. The implementation of the last workshop and the MTAC's recommendations were reviewed at each workshop, and these recommendations were used in making changes to the objectives and the technical program when required.

The evaluation of the QRT reports shows that in 50% of the cases more than a 5-year period was covered. The period covered in evaluation ranged from 5 to 12 years. The QRT had an average of seven members and, in a majority of cases, the director was the member secretary. It took almost 2 years for the QRT to complete its report compared to 6 months normally given by the Council. Usually, no specific questionnaire was prepared. In most cases, individual research projects were evaluated, but there were few comments on the work of individual scientists. In 64% of the cases, the QRT report was in line with the specific terms of reference. Most of the recommendations made by the QRT were in relation to the research programs, although the QRT did comment on the institute's policies, organizational set up, research and development (R&D) links, and constraints in the achievement of objectives of the institute.

The examination of MTAC reports of the AICRPs indicated that in most cases the period covered was more than 5 years and ranged between 5 and 26 years. The MTAC had on average five members, with a project coordinator as member secretary in the majority of cases. The Committee averaged more than 3 years to review the project. No specific questionnaire was prepared and most of the evaluations were based on discussions. The MTAC commented on the work of each centre and most of the recommendations related to the research programs, however, infrastructural facilities and constraints in achieving the objectives were also considered. There were few comments on R&D links.

The Ad-Hoc and Public Law-480 schemes are evaluated by ICAR headquarters, external referees, and scientific panels and counterpart U.S. scientists. For AP Cess-Funded Ad-Hoc Schemes, 1172 schemes were considered by 21 scientific panels of which 57% were in operation and did progress monitoring; 3% were new proposals approved by the panel; and 2% were the projects that had terminated during the quarter. Thirty-eight percent of the schemes were under different stages of processing. The scientific panels met at least twice a year usually for 2 days to evaluate the new proposals, monitor the progress, and evaluate the term reports. From the time of receipt of the proposal until its actual sanction should not take more than 6 months, however, it took about a year. The present evaluation system is fairly satisfactory as it involves external referees as well as a number of senior scientists on the panel.

Uses/Limitations of Evaluation and Recommendations for Improvement

Each institute of ICAR has been assigned definite objectives. Given these objectives, it must have major research programs incorporating national priorities and the capabilities of the institute in terms of staff and physical facilities. Within these programs, the scientists should be encouraged to take up specific projects. These projects should also be problem oriented and multidisciplinary cutting across the various divisions and disciplines, although mission-oriented basic research should also be encouraged.

Proper definition of the responsibilities of each scientist in terms of the subprojects or experiments to be conducted may encourage scientists to refrain from undertaking as many independent projects as possible and may eliminate the problem of credit sharing with other scientists. This approach may also facilitate better team work, more effective utilization of facilities, possibly help in avoiding duplication of efforts, and encourage solving a specific problem from all aspects.

On the basis of personal discussions, there is a general feeling that there is not enough appreciation of the need for research evaluation. Starting from the junior scientist upward, there is little serious effort toward proper evaluation of projects. RPFs are not maintained properly, are not submitted on schedule, are not evaluated/commented upon by research managers, and little advice is given to the scientists. There is also little contribution made by the project leader in coordination and monitoring of the project as each associate considers his or her component to be almost an independent project.

Generally, recruitment under the Agricultural Research Service (ARS) involves placement in institutes on the basis of discipline only without regard to specific training and background, staff feeling that they are research managers rather than research scientists, and further career advancement based on 5-year assessments of the work of the individual scientist creates problems in proper allocation of research responsibilities to scientists and their working on a team with a senior scientist as a project leader. This also leads to problems in the sharing of facilities, e.g., support staff, equipment, and laboratory and farm facilities.

It may be desirable to reconsider the present recruitment and placement procedures and system of career advancement. The present system of rotation of heads of divisions does not facilitate their coordinating and directing role and should be reconsidered. Heads of divisions should be considered as research managers rather than as research scientists, although they could actively participate in research and be placed at the highest level of research management and be selected through open competition for a tenure of at least 5 years with the possibility of another 5-year tenure.

Division/Project Orientation of Institute Work

There is a need to consider whether the institutes should have a divisional structure. A division should normally be required to bring a number of scientists of the same discipline together to share knowledge and common facilities.

Perhaps a few large, centralized facilities should be created. Depending upon the research priorities and facilities available, unidisciplinary/multidisciplinary projects could be formulated, and research teams involving a number of scientists from one or more disciplines could be developed. Such teams could be headed by senior scientists from the discipline that has the largest contribution to make, and the teams could be transient. The team or project leader should have all the powers and responsibilities of the head of the division for that project. In this manner, not the infrastructure (division/section) but the research projects will be funded and evaluated.

Research Project Files

Maintenance and Evaluation of Research Project Files

Maintenance of research project files in three separate forms pertaining to the initial proposal (RPF I), annual progress report (RPF II), and final report (RPF III) is basic to project formulation, implementation, and evaluation. There is no clear definition of the goals, procedures, schedule of activities, and time estimates for the project and specific work assigned to individual workers, which requires modification in the existing pro forma. Definition will help not only in proper planning and implementation but will make the evaluation more objective and satisfactory to the scientist(s) as this will be done in relation to their commitments.

At present, there is no requirement for the evaluation of the research project files by the head of the division. Although the SRCs at the institute and divisional levels are to assess the new research project proposals, monitor implementation of ongoing projects, and evaluate the term reports of the projects, it is essential that the project leader, head of the division, and the director evaluate the project files and give their detailed suggestions for improvement in the functioning of the project. More frequent reports (preferably at quarterly intervals) should also be submitted for similar evaluation for the benefit of individual scientists and the project.

The major problem for evaluation of projects encountered by the head of the division and the director is the number of projects undertaken. More effective evaluation can be possible if there are fewer projects and there is more informal interaction of the project leader, head of the division, and director with the project workers. The evaluation of a project by the project leaders, head of division, and director must be linked with the annual assessment of the scientist so that there is a correlation between the scientist's evaluation on the RPF and that given in the annual assessment report. This will also make scientists aware of the necessity to maintain and submit timely research project files. The proliferation of projects is a result of the present system of career advancement through 5-year assessments of individual research workers based on assigned work and this encourages a scientist to be associated with as many projects as possible. Also, as mentioned earlier the scientists are also interested in being involved with projects that are likely to lead to a larger number of publications as it is one of the important criteria in assessment.

It is expected that the final report would be given in a summary form not exceeding 2–5 pages. It will be necessary that, in addition, a detailed term report of the research project be prepared almost in the same pro forma as prescribed for ad-hoc research schemes and be subjected to external evaluation by at least two experts. The major use of such evaluation should be for future planning rather than in criticizing the concerned scientists.

Institute Research Monitoring Units

To provide adequate support for research evaluation and maintenance of project files at the institute level each institute must have a research project monitoring unit headed by a senior technical officer and two or three junior-level technical officers, depending upon the size of the institute. This unit, in addition to maintaining project files, will help the director in evaluating research projects in terms of the implementation of the technical programs in light of the work plan, time schedule, and inputs. It will also take the responsibility of communicating the observations of the project leader, divisional SRC/head of the division, and institute SRC/director to each scientist to enable them to improve their work efficiency and ensure that the recommended changes in the project proposals and the work plans have been made. The head of the division should also be provided with the support of at least one technical assistant for the maintenance of the project files of the division.

Staff Research Council

The SRC is the most important forum in the institute to evaluate projects. The SRC is expected to review the progress of ongoing projects, approve programs for the current year, carry out a review of completed projects, identify new areas and formulate new projects, and even identify the findings of the research projects that need field testing or can be transmitted to extension/development agencies.

Effectiveness of SRC

The major constraints in effective evaluation of projects by the SRC are the time spent on the SRC meeting and the number of projects considered. The SRCs in national institutes are held both at the divisional and at the institute level, although some institutes also have SRCs at the divisional level or at a group of related disciplines level as well as at the institute level. There is lack of active participation of scientists from different disciplines both at the divisional SRC where there is no participation and even at the institute SRC where there is limited interaction.

Because progress reports for the previous year and work program for the current year for ongoing projects and proposals for new projects being discussed at he SRC meetings are not circulated well in advance to all the participating scientists, they get little chance to prepare for any worthwhile interaction. Generally, the project report or new project proposal is presented by the project leader and there is little or no contribution made by the associates, again perhaps because of the limited time available.

To make the institute and divisional SRC effective forums for advising the administrative head (director) on approval of new projects, making decisions for the continuance of the ongoing projects and approving their program for the current year, and accepting the evaluation of completed projects, it may be necessary to have a divisional SRC meeting for unidisciplinary projects. The divisional SRC should spend more time ensuring that each project is thoroughly discussed and that there is time for the interaction of scientists other than those working in the project. The comments of different scientists should be properly recorded and the ultimate decision of the SRC as to how the projects should be modified, if such a modification is required, must be clearly indicated. Before the new project proposal or work plan for the current year of an ongoing project is submitted for consideration by the institute SRC and approval by the director, the technical section must ensure that necessary modifications to the project or work plan have been carried out.

In the case of multidisciplinary projects, separate discussions should be held for each project and involve not only the project leader and associates but also the director and heads of divisions or senior scientists from the related disciplines. This discussion will serve the same function as the divisional SRC with respect to unidisciplinary projects. The recommendations from these discussions, however, would be considered in more detail by the institute SRC. The institute SRC will, therefore, have major discussions only on multidisciplinary projects. As in the case of the divisional SRC meeting, the time spent for the institute SRC should be sufficient so that each project can be subjected to thorough discussion and the comments of different scientists and changes expected to be made on the basis of these comments can be properly recorded.

Before the project is put up for approval by the director, the technical section should ensure that the changes recommended by the SRC have been made. Some 70% of the research projects in the ICAR system are unidisciplinary, and proper functioning of the divisional research councils may help in better evaluation and monitoring of such projects. All projects before they are even discussed in the SRC must be subjected to professional evaluation with respect to statistical aspects and the possibility of ultimate economic evaluation. The involvement of outside experts in evaluation may be done at the completion of the project when the final report should be reviewed by at least two external experts.

The institute SRC should have all project leaders of both unidisciplinary and multidisciplinary projects and associates of multidisciplinary projects and heads of all divisions as members. The divisional SRC should have all the scientists in a division as members. For discussions on a multidisciplinary project, the project leader and associates and heads of divisions or senior scientists of connected disciplines should be involved.

The institute SRC will discuss in detail the multidisciplinary projects that require interaction from a larger number of scientists especially those of different disciplines. It will, however, only consider the reports/proposals on the unidisciplinary projects that are presented by the respective project leaders of each unidisciplinary project without going into detailed discussions. To make the SRC a more effective advisory body to institute administration, the number of research projects should be smaller and a larger percentage should be problem oriented and multidisciplinary in nature.

To ensure participation of scientists at different levels, a more informal interaction is suggested in the form of a weekly half-day discussion for each research project. The director, head of division, project leader, and associates and other scientists could attend and make suggestions.

The institute management board/committee is a statutory body to broad base decision-making on institute research, training and extension education programs, and allocation of resources and personnel matters. Because it has representatives of the ICAR headquarters; state agricultural university in the state where the institute's headquarters is located; state departments of agriculture, animal husbandry, and fisheries; progressive farmers; institute scientists; and finance personnel, it can play an important role in research evaluation. It is expected to meet quarterly but at least twice a year. This forum, however, is only briefed on the institute's programs and broad allocation of funds. The forum should at least review the major programs in relation to the institute's mandate, national priorities, and available resources and ensure that priority areas are balanced and have been given appropriate consideration in programing and allocation of resources.

The meetings of the management board/committee must be held regularly and agenda papers should be well prepared and circulated on time. At present, the committee meets irregularly, if at all, and briefly. There is no serious interest taken by members, except to some extent by the scientists representing the ICAR headquarters. Because the management committee/board has no special powers and can only make recommendations that require examination by and approval of the Council, and even if the recommendations are implemented, the director is solely responsible for the outcome, it has a very minor role in the management of institute affairs.

It is necessary to broaden the base and include directors of related institutes to help avoid duplication of research effort and develop interinstitutional collaboration. The board and committees can spend at least 2 weeks before finalizing annual budget allocations and reviewing the research programs before recommending those that should be continued or deciding on a reallocation of resources to these projects. Perhaps at present there is no real mechanism for a critical external analysis of the programs and resource allocation at the institute.

Quinquennial Review

Quinquennial review is the most important system for institute evaluation. The review examines and identifies research achievements of the institute with reference to their utilization (impact) and whether these are commensurate with overall expenditure (efficiency). The research programs undertaken and the funds allocated during the period under review are also examined for their objectives, scope, and relevance in relation to overall national plans, policies, and long- and short-term agencies. Links between the institute and the user agencies/farmers are also examined.

The effectiveness of the QRT, however, will depend upon the interest taken by ICAR headquarters and the institute in the preparation of material for examination by the QRT, and upon the interaction among QRT members and heads of divisions and scientists of the institute. In most cases the review is confined to the examination of reports on major programs carried out on achievements made by each division/unit and brief visits to the divisional laboratories/farm. Although the QRT looks into the relevance and scope of research programs/projects in relation to the national priorities and institute mandate, the available mechanism does not permit them to go into the details of each research project. Perhaps the continuous evaluation at the project level could best be done through the existing mechanisms at the institute and the QRT would then examine the broader programs.

The quinquennial review is not only mandatory but is a good mechanism for institute evaluation, and its recommendations can help in deciding on the research programs in relation to the institute's objectives, national priorities, and available facilities. It can also help to identify necessary changes in the structure of the institutes to meet their objectives and help in more effective and efficient planning, implementation, and monitoring of programs.

Improving QRTs

To improve the QRT's effort in evaluation the reviews should be done 1 year before the 5-year plan is formulated. The QRT is made up of senior experts related to major areas of activity of the institute, and it also has a member from the client development department(s) and industry and a professional management specialist.

The institute must develop a detailed itinerary for the QRT to permit interaction between all members. This will encourage a critical examination of the research programs and their achievements in relation to the objectives of the unit and the institute, the inputs provided, and interpersonal cooperation and sharing of facilities. It should comment not only on achievements but also on shortfalls, if any, and analyze the reasons for them and recommend remedial measures. Usually, there is an emphasis on strengthening infrastructure facilities, but there are no funds to do so.

The institute must critically review all the ongoing research projects and make the recommendations, and this should also be examined by the QRT in discussions with scientists, heads of departments, and directors. The QRT reports should be submitted within 6-9 months of the review, and processing by ICAR headquarters for approval of the governing body should not take more than another 6 months. Only important recommendations involving policies, major mandate changes, etc., should be put to the governing body for approval. Most other recommendations can be considered and approved at the DDG/DG levels.

At present, the QRT does not allow members of the management committee to be members of the QRT as they would have been continuously involved in the review of programs and policies of the institute at the same time. The evaluation, however, must involve those with authority to make changes, reallocate resources, and consider terminating projects. This is normally the responsibility of the institute director. In most earlier cases the director was also the member secretary and prepared the draft report. Although the inclusion of the director and a senior servicing scientist from headquarters would seem desirable, in reality an unbiased evaluation might not be possible. These authorities are, however, consulted at all levels of evaluation and preparation of recommendations. Most directors suggested that they should be members of the QRT.

Considering the foregoing it may not be necessary for either the director of the servicing scientist connected with the institute to be a member of the QRT. To provide secretarial help and organize the meetings/visits, however, the technical officer in charge of the research monitoring unit or any other senior officer may be the secretary of the QRT. The QRT must spend at least 1 month effectively interacting with scientists and all others concerned in different activities of the institute and the recommendations should be in line with the terms of reference given to the QRT.

ICAR Institute Evaluation

Following the reorganization of ICAR in 1966, several research institutes under the Ministry of Agriculture and Commodity Committees were transferred to ICAR. Also, a large number of AICRPs were initiated in crops, horticulture, livestock, and fisheries. Although each project has a full-time project coordinator with support staff, the responsibility of monitoring at headquarters is given to the respective ADGs. Each DDG has a large number of institutes for technical servicing without any support. Administrative and financial servicing is done by the External Establishment (EE) sections separately.

The institutes are, thus, being serviced for administration and financial matters by one unit and technical matters are being handled by another unit in the Council. The technical servicing has been rather weak. The more conscientious DDGs have taken it on themselves to develop methods for monitoring institute programs but without proper technical and administrative support, however, there is little follow up. Therefore, the DDGs/ADGs who are members of the management board/committee representing ICAR headquarters currently have only a small role in evaluation and monitoring of institute research programs.

Directors also feel that the responsibility of research evaluation and monitoring of institute programs should rest solely with them and that the ICAR headquarters servicing scientists should confine themselves to policy issues, guiding institutes on national priorities, and redefining their mandate. Currently, there is no system of institutes reporting on their major programs. The institutes provide the Council's headquarters with the proceedings of SRC meetings and a listing of research projects and annual reports, which in the present form are not conducive to any critical evaluation.

The dichotomy of research and administrative wings, the unclear role of research management scientists, and no technical and administrative support, have led to a very limited role being played by ICAR headquarters in evaluation of institute research programs. The national institutes, which have almost one-third of the investment in staff and funds, report directly to the DG and are outside the purview of research evaluation and monitoring by DDGs who are heads of the respective subject matter divisions.

Improving the Role of ICAR

The directors of the institutes should be informed of the role of the ICAR headquarters servicing scientists at different levels. The effective participation of the ICAR headquarters servicing scientist in the annual SRC meeting may help in institute research program evaluation and monitoring as well as in prioritizing research projects and allocating of resources. The Project Coordinators should also report to the concerned ICAR headquarters servicing scientist on technical, administrative, and financial matters related to the project, regardless of the level of the director to whom they are administratively responsible. The responsibilities of ICAR headquarters servicing scientists should be more clearly defined, technical and administrative support should be provided, and administrative and technical functions of the headquarters should be unified. The DDGs should also be heads of the respective subject matter divisions and given all powers that at present belong to the secretary and the DG with respect to institutes except those that cannot be delegated. There should be a single line of control and all files on matters related to institutes should pass from the undersecretary to the additional secretary, ADG, DDG, and DG.

It is essential that the Council's headquarters, in light of new developments and changing national agricultural production priorities, looks into the mandate of the institute from time to time and advises on the changes required in the mandate, programs, and infrastructure. It is usual to ask for new resources for any additional responsibility assigned to the institute or that the institute wishes to take up. The present resources and their deployment in relation to the output and priorities are not critically evaluated and steps are not taken to redirect them to new priority areas. With large, multidisciplinary research units that overlap in their responsibilities and have limited resources, it is essential to have a greater degree of centralized planning and evaluation than currently exists and for that purpose the ICAR headquarters must be strengthened. Thus, there should be strong management control of the institute programs at headquarters and suitable management information systems should be developed. There is a need for the evaluation of major programs in the ICAR system encompassing different institutes and coordinated programs to delineate clearly the responsibility of each unit and encourage interinstitutional cooperation.

Other Organizational Problems and Solutions

The current emphasis in allocation of resources is for creating infrastructure rather than funding projects. Similarly, manpower is recruited to provide a minimum number of persons in a unit rather than to meet specific requirements of a project. This is likely to result in more scientists in an institute than there are resources to support their research projects effectively. This will cause conflicts between individual scientists and the institute's interests. There is a need for a continuous review of the available resources, research program priorities, and resources requirements and to match the resources required with those available and decide on the programs that can be most effectively implemented.

There is a generalized recruitment of personnel to the ARS with much broader qualifications, and these ARS scientists are placed in the institutes according to vacancies without much consideration to their specialization. They consider themselves to be research management scientists rather than research scientists and want independent projects and facilities. The removal of three support levels without suitable replacement by technical personnel has created problems in providing research/technical support to the scientist. Much of the scientist's time is spent on technical/management tasks instead of planning and implementing research projects. It is also difficult to attract qualified scientists in most of the disciplines. This situation requires a serious reconsideration of the recruitment and placement procedures.

Summary

This country report studies the effectiveness of the present research evaluation system in ICAR and the utilization of the results of such an evaluation in improving the research system. The agricultural research system in India, made up of ICAR, state agricultural universities, and some traditional universities and private organizations, is perhaps the largest in the world. ICAR is an autonomous registered society with the objectives of undertaking, aiding, promoting, and coordinating agricultural and animal husbandry research and education. ICAR carries out its objectives through 57 institutes, bureaus, national research centres, and project directorates that are directly under its administrative and technical control. ICAR promotes research through the institution of problem-oriented, multidisciplinary, and multilocational AICRPs; AP Cess-Funded Ad-Hoc Schemes; U.S.-Held Rupees (Public Law-480) funded research schemes; UNDP centres for advanced studies; the World Bank loan; the national agricultural research project; a number of bilateral and foreign-aided projects; and through the institution of chairs of professor of eminence, national fellowships, and emeritus scientistship.

There is also a national evaluation system. The responsibility of research evaluation lies with ICAR headquarters, project coordinators, and directors of the institutes. In addition, there are specialized units at the headquarters and specialized ad-hoc committees to review various projects from time to time.

There is a formal policy on evaluation and detailed procedures and strategies for carrying out evaluation and for implementation of the recommendations of such evaluation. Of the 6500 scientists in the ICAR system, 84 are at the ICAR headquarters and are involved in research evaluation. Similarly, the expenditure on the ICAR headquarters, which not only involves research evaluation but also financial, administrative, and other supports to the research system, is INR 189 million compared to the total expenditure of the Council of INR 5204 million during the sixth plan. The ICAR's chief executive is a senior science manager, the DG, is also secretary to the Government of India in the Department of Agricultural Research and Education. He is assisted by DDGs, ADGs, and scientists in research evaluation.

The ex ante evaluation of the major programs at the system (Council) level is done by working groups on agricultural research and education. Subgroups to the working group review progress in various sectors during the past plan period, work out the priorities and programs for the next 5 years, and recommend funding of different programs. The monitoring of the plan programs as well as some of the foreign-aided projects is done by special plan implementation and monitoring units at the ICAR headquarters.

In the ICAR institutes, there is a system of maintaining research project files, containing new proposals, annual progress reports, and final reports, which are evaluated by project leaders, heads of divisions, directors, and also by SRCs at the institute and divisional level. The AP Cess-Funded Ad-Hoc Schemes and Public Law-480 schemes are evaluated and monitored by the ICAR headquarters staff and scientific panels. These projects are also subjected to outside review. A total of 676 Ad-Hoc and 92 Public Law-480 schemes are in operation. The foreign-aided and bilateral cooperative projects are evaluated jointly by the Indian scientists and representatives of the donor agencies and cooperating countries.

All the three categories of research evaluation, ex ante analysis, monitoring, and ex post evaluation, are carried out. The evaluations are undertaken at specific levels of the system every 5 years and, from time to time, at the institute and coordinated projects level through the QRTs and MTACs, at the institute projects level through SRC meetings, and at the level of coordinated projects through annual workshops. All the institutes that were scheduled for quinquennial review have been reviewed and the recommendations have been used to make changes in mandate, programs, and structure of the institutes. Similarly, all eligible coordinated projects have been subjected to midterm review and the recommendations have been used to make changes in objectives, technical programs, and to add or eliminate centres. Foreign-aided projects have also been subjected to such reviews. The type of evaluation is primarily on effectiveness. There is not much emphasis on efficiency and impact in the evaluation. All the projects are subject to evaluation and there is no selection of the projects or program.

Although respondents agreed about the effectiveness of the current research evaluation systems, there are some limitations because of research planning and allocation of resources, organizational structures, and personnel policies. There is a conflict between the individual scientist's and the institute's interest. The institutes are generally interested in solving specific production and productivity problems and undertake problem-oriented, multidisciplinary research projects that involve sharing credits and facilities among participating scientists.

Recommendations

- Research evaluation must be included in the planning and organization of research, manpower planning, recruitment, placement, and career advancement, i.e., general personnel policies, rules and regulations, and investment of powers and responsibilities.

- In the organization of the evaluation system there must be a strong program planning and control centre with a built-in system for the flow of evaluation information. The units must report to a single authority for quick and efficient servicing. The role of this centre should be to service and facilitate rather than to control.

- Although the need for academic freedom and independence for the scientists to plan and execute research has been mentioned often, it may not be possible in developing countries with inadequate resources to allow too much freedom. It may be necessary to direct research on the basis of consultation at all levels where research priorities are decided both in relation to national problems and in relation to the infrastructure and financial resources available. In research planning, there is not enough consideration of the national problems, priorities, and programs to find solutions. Well-defined objectives and mandates are needed for each research unit. It is usual to ask for additional facilities for each new program rather than to evaluate the ongoing program and redeploy resources by phasing out unsuccessful programs. It is not the research projects but the research infrastructure that is funded, and invariably more is expended on buildings and salaries and only a small proportion is left for research contingencies, which leads to insufficient funds available to complete the work program. A zero budget concept should be introduced.

- Evaluation should involve the appropriate authorities who have the ability to modify or redirect programs and reallocate resources.

- There should be a well-defined evaluation system at the institute level based on the discipline and project, and it should involve formal and informal participation of the scientists both from within and from outside the system. Adequate time should be provided for discussion of each project at the formulation stage, and its progress should be monitored during operation with an evaluation after termination.

- To broad base decision-making, the institutes should have management boards/committees with senior scientists from within the system, i.e., the institutes, related institutes, systems research management, and related development departments and state agricultural universities. A critical appraisal should be made of the institute's programs and research fund allocation to each program. To make it effective, management boards/committees should have powers beyond those of the director and should be exercised without frequent referral to headquarters.

- Evaluation must not only be in terms of effectiveness, i.e., the fulfillment of the objectives and the implementation of the technical program to meet the objectives, but it should also be in terms of efficiency, i.e., output in relation to the efforts made and manpower and infrastructure invested as well as in terms of the real or potential impact of the results of such research on production/productivity.

- Career advancement will depend to a large extent on the research achievements of an individual scientist, but it should not be in relation to the number of publications or the number of projects with which a scientist is associated as a leader or component worker. It should be based on the fulfillment of the work obligation of the scientists and the interpersonal relationship and sharing of facilities with their colleagues. There should be a clear definition of the responsibilities of each participating scientist and a time frame within which these responsibilities must be fulfilled.

- No unit in a research system should be allowed to become too large and unmanageable and an institute should be of an appropriate size to facilitate interaction at all levels.

- Because agricultural research is designed primarily to solve production/productivity problems, more time-scheduled, multidisciplinary research projects are needed. The structure of institutes based on disciplines/divisions rather than projects is not, in general, very conducive to effective implementation of research programs. It may be necessary to have multidisciplinary projects operating within a definite time frame and well-defined responsibilities of individual workers. Costly facilities required by a large number of scientists should be shared and operated by an individual scientist. They should be managed by senior-level technicians and sufficient technical support should be provided so that the scientists are free to spend more time in library consultation and analysis and interpretation of data.

- There should be greater care taken in the formulation of project proposals, which should present current information and clearly define the objectives and state the proposed technical program, time frame, and indicators of manpower, infrastructure, and funds required. The group leader, in association with participating scientists, should formally and informally evaluate the projects and offer advice and give written directions as required. Similarly, there should be more care taken in formal evaluation, monitoring, and final evaluation of the projects by the peer review teams, which may also involve external experts. Major programs, institutes, and the system itself should also be subjected to periodic review, i.e., every 5 years for major programs and institutes and every 10 years for the whole system.

- There should be more decentralization of authority in relation to responsibilities. Proper administrative support should be provided to the scientists rather than centralizing power to save on administration support.

Evaluation of Agricultural Research in Indonesia

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The Indonesian Agency for Agricultural Research and Development (AARD) conducts most of the agricultural research undertaken in Indonesia at its 35 research centres and institutes and on their associated stations and farms. In 1981, AARD began a series of research program evaluations designed to assist management in analyzing past, ongoing, and proposed activities and in identifying ways and means of strengthening the research programs, both internally and through external support. The evaluations are conducted by teams of national and foreign scientists. Their prime goal is to serve as management tools, particularly for AARD's growing pool of young managers, most of whom are trained as scientists rather than managers.

In 1984 and 1985, six reviews covering 17 of AARD's research centres and institutes were completed at an average cost of about USD 40000, excluding local staff time. The reviews are seen as having value for five groups of clients: AARD's top managers, its research institute and centre directors, its scientists, national policymakers, and donors. The reviews have made a positive contribution toward strengthening AARD's research management, particularly through broadening staff horizons. They have raised a number of important issues concerning the organization and management of planning and evaluation in AARD in relation to the Agency's rapid growth and current size.

Most agricultural research in Indonesia is conducted by the Agency for Agricultural Research and Development (AARD). AARD was formed in the mid-1970s by drawing together into a single agency all agricultural research activities in the different directorates general of the Ministry of Agriculture. The Agency is headed by a Director General who occupies one of 10 positions at this level reporting directly to the Minister. Since its inception, AARD has received considerable external assistance, particularly from the World Bank and the United States Agency for International Development (USAID). Australia, Japan, and Holland are also prominent among many other donors. During the last 10 years, nearly USD 200 million of grant and loan assistance has flowed into the Agency. Its budget for the decade to 1985 totaled USD 575 million and it is currently at a level of more than USD 60 million annually (USD = United States dollar).

When it was first created, AARD had rather limited physical resources and only about 15 staff trained at the PhD level. A chain of modern agricultural research stations has now been established and others are in the process of being developed. The Agency's current professional staff totals about 1600, of which more than 140 are PhD's and about 400 are at the MA level. When those currently undergoing advanced training return to work, these numbers will nearly double and they will increase further when existing training funds have been utilized. Ignoring wastage, the Agency will, in 10 years, have a staff of about 2000 professionals, of which half will be trained to the MA level and a quarter will have PhDs. In such a large and rapidly growing agency, it is clearly an important management function to build in some form of evaluation mechanism. Specific funds were provided for this purpose in the World Bank loans, which have supplied a major part of the capital necessary for the Agency's growth.

Before the use of the World Bank loan funds for the systematic programs of evaluation, from which most of the material used in this report was derived, agricultural research in Indonesia had been subjected to random evaluation activities. Usually, these involved donors examining research projects supported by them. In the modern era, evaluation really began with a detailed study of research needs by USAID in 1968. As a result of this, a research organization with a regional structure was proposed (although this was never implemented).

In the early 1970s, the Government of Indonesia and the International Rice Research Institute (IRRI), recognizing the importance of rice as the staple food in Indonesia, a country that at the time had a population of about 120 million (now 165 million), singled out this crop for prime attention. A cooperative research program was established supported by USAID. During the decade and a half of its existence, this program has enabled more than 400 Indonesian research workers, administrators, and extension personnel of various levels of seniority to undergo training at IRRI. An early feature of the program was a twice yearly evaluation of progress. For the last 4 years this has been reduced to an annual meeting at which both progress and future research requirements are looked at in some depth. Indonesian rice production has increased from 12×10^6t in 1969 to more than 26×10^6t in 1985. Although government support for rice prices, credit, subsidized fertilizer, pesticides, irrigation, and so forth have all played a role, there is little doubt that rice research itself has provided a major contribution to the increased productivity. The closely monitored cooperative program with IRRI is seen as a significant factor in this success (Nestel and Manwan 1986).[1]

Rice has played such a dominant role in Indonesian agriculture that research on other commodity programs has lagged somewhat behind. But, in 1983, AARD's research on potatoes was subjected to an in-depth evaluation by a joint team from the Centro Internacional de la Papa (CIP) and AARD. Animal production research was also comprehensively evaluated in 1980, although the evaluation was limited to the support provided by the Australian Development Assistance Bureau (ADAB) and did not include the whole animal science program. From time to time, bilateral programs supported by other donors have also been evaluated by their donors, but such evaluations have been largely confined to expenditures and training targets. Some more recent evaluations, however, particularly ones associated with USAID and World Bank projects, have included an evaluation of research performance.

The first initiative in the direction of establishing a structured evaluation program in AARD took place in 1981 when, at the request of the Director General of the Agency, the International Service for National Agricultural Research (ISNAR) provided a team of eight external consultants to make a broad overview of the progress that AARD had made in its first 5 years of operations. This review, which entailed a month of field work and a short period of report writing, was modeled on the quinquennial reviews of the International Agricultural Research Centres (IARCs).

The ISNAR team gave a positive report on the progress achieved, indicated some priorities, and suggested changes in direction for the next decade. One of its recommendations was that AARD should establish a formal system of monitoring and evaluating its activities. In 1983, AARD came back to ISNAR and requested their collaboration in structuring a methodology for establishing an evaluation program suitable for the activities and management of each of its major program areas. After considerable discussion it was decided that ISNAR would assist AARD in conducting a series of 10 subsector research programs or activity evaluations during a 3–4 year period. The order in which the review would be carried out was selected by the Director General of AARD. Each evaluation review was to be designed with a broadly similar format so that at the end of the series of reviews the various reports could be aggregated into a comprehensive and detailed overview that would update the one that ISNAR carried out in 1981. At the same time, the development of a fairly standardized, albeit flexible, methodology was seen as a key issue in developing in-house expertise in evaluation. During 1984 and 1985, six of these research programs reviews were conducted by AARD with assistance from ISNAR. This paper discusses actual experiences in these reviews in the context of the outline document prepared by the organizers of this meeting.

Objectives of the Reviews

The principal objective of these subsector research program or activity evaluations is to assist the management of AARD in analyzing their past, ongoing, and proposed future activities and in identifying ways and means of strengthening the research programs, both internally and through external support. The prime clients for the evaluations are the AARD management, in particular the relevant institute directors and research-station managers. External agencies and policymakers are secondary clients in that the evaluations are of interest to them, respectively, in terms of monitoring the performance of specific projects and in gaining an independent assessment of the areas where additional support (either external or internal) might be most effective.

The designation of AARD administrators and managers, however, as the prime clients means that if the evaluations are to be effective and to have an impact they must have the support of AARD's senior management. Thus, the reviews need not only to be professionally objective but also to present their findings in a manner that is acceptable to AARD management.

Methodology

It is important to note that the Indonesian evaluations are essentially management tools. They focus on analyzing past performance and monitoring existing activities in terms of national goals; looking at the ways in which priorities are set, programs formulated, and implemented; examining what resources are available and how they are utilized; reviewing links with the scientific community, with policymakers, and with the clients of the research; and also attempting to assess the impact of the programs being evaluated. Throughout these activities the evaluations focus on examining how to help the program managers in decision-making to make their programs more effective in the future. In so doing, there is an element of ex ante analysis in terms of looking at what should be the program's future priorities in relation to available resources and national goals and in assessing whether the current program meets these priorities. This type of examination has resulted in recommendations being made regarding shifts in resource use and about the level of resources that need to be allocated to specific tasks. But it is not ex ante analysis in the normally understood sense of this expression, and no attempt has been made to do this type of analysis.

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[1] Nestel, B., Manwan, I. 1986. Indonesia and the CGIAR centres — a study of their collaboration in agricultural research. World Bank, Washington, DC, USA. Consultative Group on International Agricultural Research paper 10.

Ex post evaluation has also not featured strongly in the Indonesian reviews because most of the programs examined did not start until the mid or late 1970s, and for the first few years of their existence the main activities were the creation of physical infrastructure and sending staff off for advanced training. A number of programs now have a critical mass of researchers, but very few have had this for long enough for there to be a measureable research output. Among those programs where this is feasible are food crops and animal science. The review of food crop research that has been completed did contain a fairly detailed evaluation of program impact. But the whole AARD program has really not developed far enough for impact analysis to be a standard activity, nor is it yet possible to utilize a logical framework analysis in program planning. Such concepts are recognized but are likely to require at least another 5 years before they can be meaningfully utilized. Also, except for rice (and some export crops) where appropriate data are available (Nestel and Manwan 1986), research programs are not considered to be long enough established for cost-benefit or internal rate of return calculations to be justified.

Given the newness of AARD, the current evaluations focus very much on "inputs" rather than on "impact" and give a great deal of attention to the processes of priority setting and program formulation. This is justified on the grounds that there is little point in the future at looking too closely at the effectiveness or the efficiency of programs unless these programs are clearly the most appropriate ones in terms of their importance to national goals. Nor is it considered by AARD top management to be particularly useful to talk about program impact in an organization that is only 10 years old and where most of the major research components are much younger. Even in the older programs, where impact evaluation has been undertaken, there are difficulties in evaluating impact because of the very separate identities of the research and the extension agencies. This means that "good" or "adoptable" research findings do not necessarily have a rapid input at the farm level. This gap between research and extension is one that occurs in many countries and has been repeatedly highlighted in the reports from the Indonesian series of reviews. Notwithstanding this, however, the transfer of some new technology, particularly for rice, has taken place in Indonesia at remarkable speed.

These reviews were, in the first round, deliberately chosen to be program, rather than institute, reviews. This was done for two reasons. The first was a conscious attempt by top management to inculcate into staff a holistic agency-wide attitude rather than the narrower institute approach that most of them were more familiar with. The Director General was keen to stress the need for interinstitute links, particularly in areas involving programs such as economics, statistics, soils, and information. In these fields, there are not only specialized research centres associated with these topics, but also specialists working in them who are located in the commodity-research institutes and centres. An agency-wide approach is also relevant to areas such as postharvest technology and farming systems research where there is currently no lead centre but many institutes with related programs, often working in isolation of each other. An effort is now being made to utilize such an agency-wide approach in three new regional development projects.

A second major reason for making the reviews "program" based was to try to change some research institutes' and directors' attitudes toward evaluation. Several directors were familiar with evaluation mainly as a donor activity to "inspect" how funds had been utilized. They saw evaluation as an external policing of their programs and not as a managerial tool with which they could make their own institutes more effective.

AARD's Director General attempted, wherever this was possible, to improve this situation by giving first priority to evaluations of programs involving several institutes rather than just a single one. Various additional measures were also adopted to involve institute directors. One was by having them participate actively in the selection of the review teams, particularly the national consultants. Another was by inviting all 10 of AARD's senior directors to participate in the meetings at which each evaluation team made an oral presentation of its findings to AARD's Director General. These presentations, which started off rather hesitantly, have become frank and constructive and invariably offer a sympathetic analysis of the program being examined. In each case, every member of the team, both national and overseas, makes part of the final verbal presentation, which is viewed as a team effort and not just as an effort of one of the foreign consultants. The evaluation team meets with the senior director(s) involved before making any general presentation. This ensures that the key recommendations can be discussed informally in advance.

This is of vital importance because recommendations that are unacceptable to senior managers are unlikely to be implemented, hence, it is essential that senior managers are forewarned of any major recommendations that will be made concerning programs for which they are responsible. This approach has led to some excellent and effective dialog between the evaluation teams and top management. The team may not always initially understand all the constraints that a national manager has to cope with. But a report that is unduly critical, however correct the report, is unlikely to be implemented. Considerable effort is put into trying to avoid controversy and using clear and constructive language in the reports in places where there could be some reluctance to accept a recommendation.

There can be a particular problem when a review team considers that a program is badly led. But, in general, the reviews have not looked in detail at the performance of individuals. It has been felt that this was not the best use of external consultants working against time constraints and that they should concentrate more on policy and structural issues. The evaluation teams have, however, identified program monitoring and staff evaluation as being two areas in which AARC needs to develop a structured approach. The teams have suggested, in several reviews, that AARD should develop this monitoring and evaluation as a routine in-house procedure. As a first stage in this process, AARD has already established a new project protocol that lends itself to monitoring and evaluation at the research project level. This protocol is currently being tested and could ultimately lead to the introduction of a logical framework analysis that would permit monitoring and evaluation at the program, as well as the project, level.

The reviews are expected to be objective. It is recognized that in a new and rapidly expanding agency there are a number of people in management posts who have had limited experience of management, although all new directors do undertake a 3-month management training course. A key objective of the reviews is to assist these scientists in strengthening their programs and their management skills. In a young agency, with many of its research leaders being relatively new PhDs, this means that the evaluation teams have had to steer a narrow course between being too critical (and thereby damaging morale) or too laudatory (thereby failing to provide a challenge). The teams have had to recognize the difficult jobs and awesome responsibilities that have been thrown at many program leaders. At the same time, the review teams have had to set scientific standards that will help strengthen the Agency's programs.

Each team has been made up of four groups of people:

(a) Senior scientists from the research program being evaluated. These are usually second-level staff from the program or institute under review. Scientists at this level are senior enough to influence future policy but are not locked into defending the existing one.

(b) Overseas consultants who are international figures in the commodity being evaluated. Ideally, such consultants have some prior experience in Indonesia so that they have some understanding of both the research system and the culture.

(c) National consultants from government or university circles who may be either biological scientists or social scientists (preferably from policymaking units). Their task is to contribute another dimension (particularly the research-extension-farmer link) to the teams' discussions. The inclusion of this group serves another purpose in that it helps to involve local personnel in a fairly rigorous evaluation approach and this will (hopefully) lessen the Agency's dependence on costly external consultants in the future.

(d) For purposes of continuity each review has the same two-person secretariat to ensure that the team is comprehensively briefed, to assist the scientific group being evaluated in the preparation of the required data base, and to take responsibility for editing and producing the report. This group consists of one person from the evaluation unit in the AARD secretariat and one consultant from ISNAR.

The AARD secretariat is one of 10 second echelon units in AARD (Fig. 1). It contains five organization units, one of which is concerned with programing, planning, monitoring, and evaluation. This whole unit, of which evaluation is only one component, currently consists of only three full-time professionals, although it is able to obtain short-term secondment of staff from other parts of the AARD secretariat. It is, however, very thin on the ground and staffed at only the fourth echelon level.

ISNAR's role in the Indonesian review process has been to help in the design of the methodology, to provide inputs to the secretariat, and to help maintain continuity throughout the series of reviews. But the reviews are not ISNAR reviews, they are AARD reviews published in AARD's name and with the approval of its Director General. Furthermore, all team members sign the evaluation report including the national staff members, who, thereby, have a direct commitment to seeing that the findings are implemented.

Each review covers a major program such as

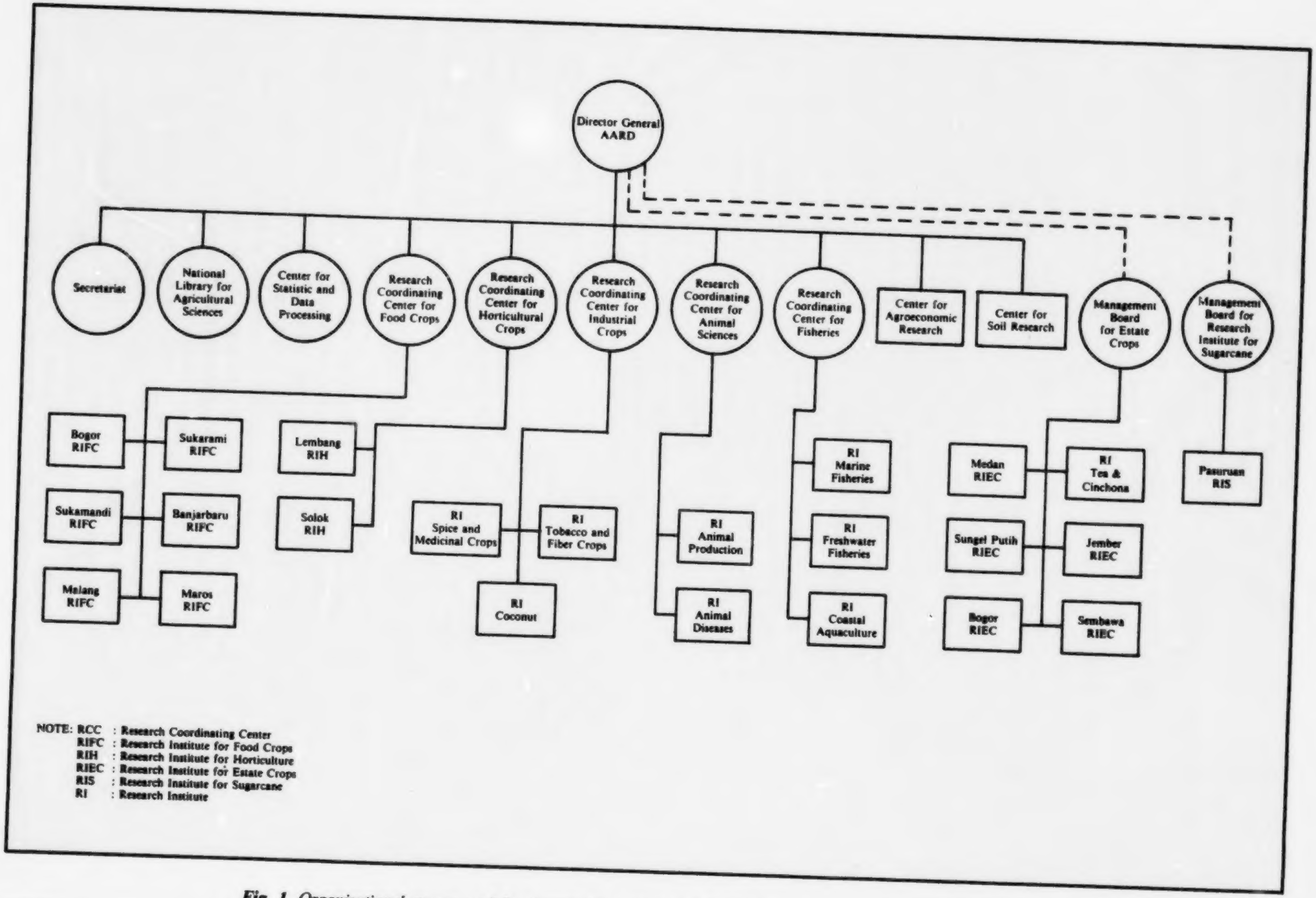
Director General AARD
Secretariat
National Library for Agricultural Sciences
Center for Statistic and Data Processing
Research Coordinating Center for Food Crops
Research Coordinating Center for Horticultural Crops
Research Coordinating Center for Industrial Crops
Research Coordinating Center for Animal Sciences
Research Coordinating Center for Fisheries
Center for Agroeconomic Research
Center for Soil Research
Management Board for Estate Crops
Management Board for Research Institute for Sugarcane
Bogor RIFC
Sukarami RIFC
Sukamandi RIFC
Banjarbaru RIFC
Malang RIFC
Maros RIFC
Lembang RIH
Solok RIH
RI Spice and Medicinal Crops
RI Tobacco and Fiber Crops
RI Coconut
RI Animal Production
RI Animal Diseases
RI Marine Fisheries
RI Freshwater Fisheries
RI Coastal Aquaculture
Medan RIEC
RI Tea & Cinchona
Sungei Putih RIEC
Jember RIEC
Bogor RIEC
Sembawa RIEC
Pasuruan RIS
NOTE: RCC : Research Coordinating Center
RIFC : Research Institute for Food Crops
RIH : Research Institute for Horticulture
RIEC : Research Institute for Estate Crops
RIS : Research Institute for Sugarcane
RI : Research Institute

Fig. 1. Organizational structure of the Agency for Agricultural Research and Development (AARD).

horticulture, livestock, food crops, etc. Each of these programs involves anything from 1 to 6 research institutes that collectively may have anything from 5 to 20 research stations and 15 to 50 research farms. Many of the latter are quite small and most of the senior scientific staff are located at the major institutes with some being outposted to the bigger stations. Thus, each review may involve visiting 1–10 stations and institutes, plus a selection of farms, plus a number of extension-service personnel. This poses time problems because it is frequently difficult for both senior national staff and high-quality consultants to be fully involved for more than about 3 weeks at a time. It was decided, therefore, to structure the reviews to last for 3 weeks, although obviously extra time is needed subsequently for reporting.

The present round of reviews encompasses three major evaluations each year and, including the final overview, will take 4 years to complete. It is synchronized with the national planning process in that the final overview in 1987 will be completed in time for the Director General to incorporate its findings and that of earlier reviews in his submission for the next (1989–94) Five-Year Plan, which has to be tabled in 1988. It is envisaged that a second cycle of reviews will then begin in 1989. The evidence from the first cycle suggests that now that the review process is well accepted within AARD it may be desirable to structure the second round of reviews on an institute, rather than on a program, basis. This will make the reviews somewhat easier to organize and will facilitate a closer evaluation of the chain of responsibility.

Each review has standard general terms of reference, plus any special terms of reference requested by AARD's Director General. There is a standard draft outline for the report and for the key tables and these are given to each review team. This material has to be modified for each evaluation, for example, not all of the questions relevant to fisheries would apply to economics. But the terms of reference and the outline do attempt to spell out the most important questions the team is expected to answer:

- The team will review the program activities and management of the specific program of AARD.
- The primary purposes of the review are to (a) provide the Government of Indonesia, AARD, and particularly the relevant institute directors with an analysis of the past, ongoing, and proposed activities of the particular research program; (b) identify ways and means of strengthening the research program; and (c) increase the in-house evaluation capacity within AARD.
- The review will form part of a series of about 10 reviews that will eventually cover all of AARD's activities and will examine both the achievements of the research programs to date and their objectives for the period until 1990.
- The review is expected to report on the past, existing, and proposed programs of the research program and to make recommendations with respect to: (a) their management; (b) the quality and relevance of the current and proposed research; (c) the adequacy of the human, physical, and financial resources; (d) the effectiveness of the links the program has with the scientific establishment both in Indonesia and overseas; (e) the nature and effectiveness of the linkages with the extension services and other agencies providing services to agriculture; and (f) possible new areas for national, regional, and international support.
- Each review team will be expected, so far as is practical and relevant, to report within the framework of the attached outline so that its report can be incorporated into a global overview at the end of the series of reviews. For each program reviewed additional, "specific" terms of reference will be drawn up.

For each evaluation the secretariat provides the team with a very brief note on the country setting, structure, and organization of the institute or program being reviewed. The team is not asked to devote a lot of effort into preparing this sort of background material, it is assumed that both they and the principal clients of the reviews are familiar with the background. The report contains just enough background (much of which is common to all reviews) to present a coherent story to outside readers such as donor agencies.

The team is asked to comment in depth on specific questions relating to planning and budgeting; manpower and training; facilities, equipment, and supplies; research output; management; communication links; and impact. The team's comments are based on a program that usually includes 2 days of briefing, 2 weeks of field visits and interviews, and about 3 days drafting plus a 1-day presentation to the Director General and the heads of all 10 major AARD units.

For report drafting, each team usually splits into three or four groups, each has an outline to produce about 40 pages of a double-spaced manuscript (12 000 words) so with background material the reports tend to average 80–100 pages single spaced, plus 30–60 pages of tables. Each report is edited by the team secretariat and is sent to AARD headquarters and all team members for clearance and correction. The draft report is discussed by the secretariat with the director and senior staff of the program under review and with the top management of AARD before the report is finalized. Most reports are subjected to these discussions about 2 months after the mission finishes its fieldwork and are published within 2 months of these discussions.

Table 1. Manpower inputs and costs of evaluation reviews in Indonesia.

Review	Fieldwork (weeks)	Consultants		AARD staff	Total team size	Costs (USD '000)[a]		
		Overseas	Local			Fieldwork	Report	Total
Horticulture	3	3	0	3	6	27	4	31
Food crops (not rice)	3	4	1	4	9	41	4	45
Fisheries	3	5	2	5	12	54	3	57
Economics and statistics	2	4	2	3	11	32	2.5	34.5
Industrial crops	3	4	2	4	10	45	3	48
Library and publications	2	3	2	2	7	25	2.5	27.5
Total	16	23	9	21	55	224	19	243
Total individuals involved	—	18	6	17	41	—	—	—

[a] For AARD staff assigned to an evaluation team costs include only per diem and travel, they exclude all preparatory costs for documentation provided by the program being reviewed and time inputs for AARD staff either on the team or being interviewed. For consultants, costs also include honoraria (USD = United States dollar).

Table 1 summarizes the manpower inputs and the costs of the six reviews carried out in 1984 and 1985. During these 2 years, the fieldwork of the reviews occupied 16 weeks, an average of 8 weeks/year. The secretariat preparation and editing time occupied a further 2 weeks per review so three reviews a year represented about 14 weeks of secretariat time input.

Fifty-five persons are listed as being involved in the reviews, but because the secretariat staff was common to all reviews and three local consultants each participated in two reviews, the total number of individuals employed in the six reviews was 41 rather than 55. Individual reviews cost between USD 25000 and USD 54000 for the fieldwork, with the editing costs being provided by ISNAR. For a 3-week review, the total cost (including per diem and local and foreign travel) of an external consultant was about USD 8000, a local consultant about USD 4500, and the incremental costs (travel and per diem) for an AARD staff member about USD 1000. These figures exclude all AARD salary costs including the extensive time inputs in preparing background material by the staff of the program being reviewed.

The total annual cost of about USD 120000 represents 0.2% of AARD's annual operating costs, i.e., 1/500th of the annual budget is being spent on evaluation. But perhaps 0.3% would be a more realistic figure if the AARD staff inputs for preparing background material and participating in the reviews were also included.

Evaluation Findings

Each review has presented between 50 and 80 conclusions and recommendations. Although this may seem a large number, each review usually covers two or three major research institutes. Thus, even 80 recommendations mean about 20 per institute and, perhaps, 20 for the research centre coordinating the group of institutes.

In general, the reviews have found program objectives to be relevant to the mandate but have suggested that priority setting and program formulation were still somewhat ad hoc. In many institutes, this situation is inevitable given the number of key staff away on training. But in terms of future strategy, all reviews have devoted considerable effort to making recommendations for improving the priority setting and program formulation processes and for strengthening the central direction of these activities.

Each review has looked at a random selection of research projects by following through their protocols and reports from planning to completion. The quality of the research being carried out has usually related to the level of training of the scientists concerned and has generally been reported on as meeting international norms, especially where scientists with higher training are concerned. In many institutes, the support provided by donors over the last decade has resulted in physical resources now being adequate, although some gaps still exist. Generally, the use of existing resources was satisfactory. In some cases, resource use has been limited by the difficulty in ensuring that operational research funds were available at the same time that trainees returned from overseas.

One of the weaker areas highlighted by the evaluations was the link between AARD's 35 different units (see Fig. 1). Each one appeared to be more effective in doing its own work than in servicing relevant sister institutes. Thus, the institutes concerned with economics, statistics, libraries, and publications were seen as conducting effective in-house programs but as having scope for providing much more in the way of support services to scientists in other institutes that have staff working on these subjects. Part of the reason for this is because of the degree of autonomy, sometimes jealously guarded, of individual institutes. One conclusion emerging from the reviews to date is that AARD may need to have a stronger central planning and coordination of activities that transcend institutional boundaries.

Although the reviews have highlighted research impact, where this was practical, they have generally concentrated more on management issues, such as program formulation and resource utilization, rather than on trying to measure impact. They have, however, stressed the need for more sharply focused priority setting and program formulation as this will enable the next series of reviews to quantify impact. This is likely to be a very important task if the Agency is to be able to justify effectively a budget commensurate with its future size.

Utilization

There are five groups of clients that AARD has identified as users of its evaluation reviews. These are its own top managers, its institute managers, its scientists, national policymakers, and donors. Each of them has different perceptions and priorities and it is, perhaps, a reflection of the success of the reviews to date that all five groups of clients have utilized their findings.

AARD Top Management

AARD's top management, which initially was a little uncertain whether the Agency was ready for this type of activity, has become a strong supporter of the evaluation reviews and has actively participated at the roundtable presentations that conclude each review. These presentations usually lead to 4–6 hours of discussion involving comments from the Director General and all 10 senior directors. The Director General has made it clear that because the programs under review have had their own staff as members of the review teams he expects the findings to be either implemented or the reasons for not doing so to be clearly spelled out.

AARD's top management has also utilized review findings as supporting arguments in the cases that it has made with other research agencies to the State Minister for Research and Technology and to the State Minister for Utilization of State Apparatus for reorganizing certain conditions of service for AARD staff. The relevant review recommendations are those concerning the improvement of technicians' salaries, the establishment of a merit pay system for scientists, and improvement in the terms of service of professional support staff in areas such as the library and statistics. All of these issues have now been either resolved or are at an advanced and encouraging state of resolution. The Director General's initiative in following up such matters is seen within AARD as a very positive link to the evaluation review recommendations.

Another major aspect of the Director General's support for the reviews is his statement that he wishes the review recommendations, including that of the final overview, to be used as a baseline document for preparing AARD's case for organizational and structural change in the next Five-Year Plan. This clearly puts pressure on all institute and centre directors to ensure that their views on future programs and strategies are clear when programs for which they are responsible are evaluated.

Institute and Centre Directors

The research institute and centre director levels are the prime clients for the evaluations. These are the managers, each with a fair degree of autonomy, that the reviews seek to influence the most. They comprise the 10 senior directors (including the head of the secretariat) and the 23 institute directors responsible to them. Their individual attitudes and responses to the reviews have varied considerably and relate very much to the interests and skills in management of individual directors. But in all cases, directors have been urged by the Director General to either implement review recommendations or to make a good case for not doing so. In some cases, directors have responded to this within a matter of weeks of a review being completed, but in others, progress has been much slower.

All directors of institutes reviewed to date have recognized that recommendations relating to priority areas for strengthening their institute can be used as a means to help attain this goal. They have done this either by seeking new donor support or by obtaining a larger or different share of support in projects already under discussion. In no case to date have directors disagreed with team findings with respect to suggestions for strengthening their institutes or for moving into new program areas. Thus, although some directors have difficulties in accepting all of the changes recommended by the reviews, especially those that propose reductions in activities, all of them recognize the challenge that the reviews represent to their management talents and all are responding, albeit to different degrees.

A number of the program recommendations transcend institute boundaries and involve service activities from several centres such as the secretariat, the statistics and data processing centre, the agroeconomics centre, and the national library. The implementation of such recommendations involves changes in lines of authority and are really Director General decisions of some complexity. Limited progress can be made on some of these without a ministerial decree, and action on this has been withheld deliberately pending the completion of the series of reviews. This is an understandable situation but one that does retard progress in certain areas.

Scientists

Although the reviews have some value as educational documents of value for the in-service training at the individual scientist level there are only limited parts of the findings that the individual scientist is able to relate to personally. This is, however, possible for those parts of the recommendations that relate to research methodology and to scientific programs. It is too soon to know the extent to which the reviews are being utilized in this context. But the three fisheries research institutes had all of their senior professional staff spend 2 days participating in a page by page internal analysis of the fisheries evaluation review and, as a consequence, a large number of recommendations were adopted for early implementation. In this case, the senior director concerned has done an excellent job in following up the dialog that he had with the review team. There would also appear to be some scope for using the review reports as case study material for strengthening planning and program formulation in individual institutes, and exploratory talks on this subject are being held with ISNAR.

Policymakers

The link with policymakers is primarily through the Director General's office and has already been referred to in the discussion on legislative changes. A policymaking link has also been developed in the reviews by interviewing the Secretary General of the Ministry of Agriculture and the Director of the Bureau of Planning in the Ministry of Agriculture as part of the actual program of some reviews. Yet, another link with policymakers has been through having special advisers from the offices of either the Minister of Agriculture or one of the three Junior Ministers acting as national consultants in three of the six completed reviews. Whether or not these links will result in review findings being utilized by policymakers at the heart of the Ministry cannot yet be predicted, but it does seem that these links have helped to build up, within the staff of the Minister's office, a better understanding of the research system and its problems and progress.

Donors

Although donors are not the prime clients for the reviews, AARD's two major donors, the World Bank and USAID, have followed the review process closely and a large number of features of pipeline research projects for USD 7 million from USAID and USD 65 million from the World Bank relate closely to recommendations arising from this series of reviews. In some cases, these recommendations were no more than a review team endorsing or reinforcing an already identified AARD priority. In other instances, the reviews have suggested new priority areas that AARD has subsequently endorsed. There is clearly a time lag in this process, but by the end of 1985 new areas of support identified in the three 1984 reviews (horticulture, upland food crops, and fisheries) and the first 1985 review (economics and statistics) were already assured of external funding.

Lessons Learned

The approach used in Indonesia is specifically designed for AARD at this stage of its development. For reasons already clarified, it stresses management rather than impact. Because the approach is innovative in Indonesia, it is still in the early part of the learning curve. Experience to date suggests certain strengths and weaknesses in the approach being used and some comments on this may be of interest.

Strengths

The involvement of both directors and scientists in the review process means that it is "their" review, it is more internal than external and there is, therefore, a commitment to take heed of the findings.

The involvement, at both the first and the final session, of senior directors, from all research centres or institutes, highlights the agency-wide nature of the reviews. Directors are starting to see the evaluation process as a common procedure not directed specifically at their institute. They see that other directors often share their problems but may have different strengths and weaknesses in their respective programs. The interdisciplinary nature of the final presentations highlights the need for better links between different research units or research programs or both. This is essential in an agricultural economy where much of the land is under mixed cropping rather than monoculture.

The reviews are output oriented and thereby introduce the concept of accountability through their examination of priorities, links, and impact. Such a concept is new to many research managers who are trained as scientists (usually biological scientists) and have grown up in an environment where the resources available for research (human, physical, and financial) were minimal. Within the space of a very few years, AARD has changed its resource base and it is now a large organization whose volume of funding is significant enough to invite public questions about the costs and benefits from the use of these funds. Such questions are already being asked in the press and in parliament, and directors are becoming increasingly conscious of accountability and the value of evaluation in this context.

The review process in Indonesia is a very open one that involves a wide-ranging and frank dialog with as many managers and scientists as the evaluation teams are able to meet. In general, AARD scientists have little difficulty with the technical questions posed by evaluation teams, but many scientists tend to think of research activities very much in terms of their own specialized interests rather than against a background of broad strategy. The reviews are asking, from staff at all levels, a series of questions relating to topics that are not always given a great deal of consideration internally, except at the very highest level. In this sense, the reviews play a useful role in helping scientists to broaden their horizons. Many of the questions asked are challenging, and the responses are leading AARD to reconsider certain issues. The reviews can, therefore, be considered as a form of in-service training. The benefits from such training are apparent in terms of the number of review recommendations already being implemented.

Changing staff attitudes is not an easy task and, for this reason, on many issues the evaluation reports are posing questions and identifying options rather than suggesting concrete solutions. This leaves as much decision-making as possible with the relevant directors and, therefore, encourages them to rationalize and better manage their programs. Because the review teams are essentially components of the local system, their recommendations are generally supported by the system and represent its perceived needs for priority action in donor support. Many directors are more confident in pursuing donor support through this route than through the recommendations of reviews of missions that are primarily responsible to a donor rather than to AARD.

Weaknesses

The major weakness associated with the current evaluations arise from the organizational structure of AARD, which places the evaluation unit at a low level in the hierarchy. This means that evaluation is not a particularly attractive career posting and the staff of the unit are disadvantaged by being much junior in status to the heads of the program or institutes that they help evaluate. In addition, the secretariat, of which the evaluation unit is a part, does not have a line of authority to enforce the implementation of review recommendations. Even if such a function were to exist there are not enough trained staff available to do effective follow-up studies. Thus, there is a major problem in organizing a structured follow up to the current evaluation reports. Measures are being taken to overcome this by strengthening the staffing of the evaluation unit, but this will take some time and will not overcome the structural problem. The subject is mentioned here not as a criticism of the evaluation unit but to highlight an organizational problem relating to evaluation that may warrant further discussion.

Most of the other weaknesses identified in the following relate closely to the foregoing point. For example, the background dosiers prepared for each review by the AARD program staff are far from uniform, although there is a uniform protocol. In some cases, programs, particularly the stronger ones such as food crops, have provided the review teams with in-house answers to all of the questions listed in the general and specific terms of reference, and this has given the teams a good start in terms of issues for discussion. In other programs, a very basic brief has been provided and the team has been hard pressed to cover its terms of reference in the time allocated. This has usually resulted from the program under examination being short of staff, often with many away doing postgraduate training. But the evaluation group in the secretariat who might help fill the gap is also too short staffed to do so.

The calibre of AARD staff on the review teams is also variable and is dependent upon the level of expertise within the program under review. Where the program staff is weak, considerable responsibility is placed on the external consultants. In one case, this led to a review being very critically received initially by the relevant director.

Directors have also adopted variable attitudes toward the use of local consultants. Some have sought people who are known to question the justification for a large national research system, particularly people from policymaking circles. Others have been hesitant to welcome onto the team potential critics from outside of AARD. Again, the secretariat has not yet developed an appropriate pool of local consultants, and the concept of training local personnel in this difficult aspect of consultancy work, to build up a national pool of such expertise, probably needs to be pursued more vigorously.

All reviews to date have had difficulty with objectively examining the interface with extension, an area that is of vital importance in terms of impact evaluation. This is partially a question of having adequate time during the review process and partly one of structure, because research and extension are handled by separate agencies. Although, in theory, the linkage between the two agencies is strong the reviews have indicated that in many instances it is ad hoc and rather fragile. The review teams have not really been able to come to grips with this issue, and it represents an area in which more thought and attention are required.

Because of the structural problem referred to earlier, any follow up to the reviews depends, to a large extent, on actions by research institute and centre directors. The response has generally been positive but within very different time parameters. The secretariat does not have the direct power to enforce change, this can only be done by directives from the Director General or in some cases, through ministerial action, which may be practical until the cycle of reviews has been completed.

The reviews have been followed by significant donor inputs, although these have arisen on a somewhat ad hoc basis, review by review. There is always a danger that each review will recommend expansion in the relevant program beyond the likely total financial resources. Indeed, the system of reviewing 10 different segments of AARD before completing an overview obviously puts considerable responsibilities on the team doing the overview and is open to criticism. Hopefully, the use of a common methodology and the presence of a common secretariat throughout the review series will help to keep plans for expansion within a realistic perspective. A strong input from AARD's planning and evaluation unit would provide an even greater safeguard in terms of linking review recommendations to a long-term growth horizon.

Donors have sought out the review reports, which are basically internal documents, and have been active in helping AARD to meet some of the relevant recommendations. This donor link has tended initially to be at the research institute level rather than with the secretariat. This again would seem to be somewhat of a risk in terms of having a balanced future program closely related to national priorities.

Conclusions

On balance, AARD's senior management feels that the evaluation reviews are serving a useful purpose in strengthening the management capability of a large and rapidly growing research organization where many young and highly trained scientists have to undertake management responsibilities, for which they have limited specialized training, early in their professional careers.

Evaluation teams including a mix of international specialists, national consultants, and AARD staff have been able, with a tightly structured program, to produce comprehensive draft reports of practical value in 3-week missions. The reviews have focused heavily on management rather than on specific research outputs, given the newness of AARD and the time parameters associated with agricultural research. But in the next cycle of reviews, more emphasis will need to be devoted to research outputs and impact.

A key feature of the review is the involvement of AARD scientists in that the reviews are essentially internal with external participants, rather than external, and, as such, they arouse little of the suspicion and defensiveness that evaluation reviews all too often encounter. In many instances, the conclusions of the reviews identify and analyze problems without necessarily defining the solutions, leaving the options open for the research managers to decide upon.

A number of the reviews have suggested that in an organization as large and multidisciplinary as AARD there is a need for a greater degree of centralized planning and evaluation than currently exists in AARD. This topic is being examined in a forthcoming review of AARD's management and administration.

Maximizing Benefits from External Evaluations

Donor Evaluations: What Is and What Could Be

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It is one of the ironies of public administration that while the few donors then in operation in the early 1950s were exercising quality control by merely verifying the deliveries of goods and services, the Government of India was establishing an evaluation capability within its National Planning Commission. Yet some 20 years later, when the donors "discovered" evaluation of development, they acted as if they had founded the field. It is the thesis of this paper that donor evaluations have yielded valuable information, but that almost by definition they cannot be as relevant to development as can quality control steps instituted by local and national entities acting as the responsible parties for the development context being reviewed. Indeed, constructive steps are being cautiously initiated by donors to help build local capabilities to monitor and evaluate.

It now remains to be seen if the donors will take the next logical steps by phasing out their evaluation work as countries phase in their own systems. To spur this on, countries working with donors can take a number of steps to co-opt and make good use of donor evaluation resources. The aim should be a peer network of national evaluation experts learning summative and comparative lessons from the substance and similar lessons from the process of indigenously led, policy-focused evaluation.

The scientific method, the bedrock of agricultural research, is also the foundation of evaluation. It is, thus, to be expected that one sees a good deal of relative progress in the evaluation of agricultural research. The general setting of development in the Third World has encouraged evaluation in recent years. This has arisen to an extent out of necessity: resources have been and are likely to continue to be extremely restricted. One cannot, as a result, count on an abundant flow of budgets to minimize the harm of poor investment choices. Administrations must be more quality conscious to conserve very tight resources. To this extent, evaluation is a countercyclical phenomenon, and so the market for the field is good now and is likely to remain so for a long time to come.

For some years now resources have also been tight among the donors, and this has naturally led to more interest by these institutions in evaluation. In part, this has complicated life in some Third World settings. Evaluation has often come to have negative implications as a means for donors to inspect aided projects (Murphy 1985:1). It is often perceived as a threat to the continued flow of external aid thus compounding the already difficult task of gaining cooperation for evaluation.

At its best, evaluations can help direct thinking to the more fundamental questions that may receive insufficient attention in the concerns for short-term operations and survival. Monitoring alone will not do the job.

> . . . the research capacity in a country is *not* a simple sum of well-trained researchers, adequate building, and well-equipped laboratories. These are means, not ends. The research capacity in a country depends upon how well these means can be made to function and fulfill the mandate of providing farmers with tools (improved practices and technology) that can lead to increased food production, and whether the political, economic, and social environments (at national and local levels) allow these means to become effective (Murphy 1983:19).

Part of a commitment to the scientific method is not to exclude knowledge merely because of its source, hence, those in the Third World with a responsibility for operating programs might find some of the evaluation findings obtained by donors to be useful — even as they would wish that in some cases the donors had not gone to the trouble to start with. The lessons, in fact, are important because in some parts of the world they represent the major source of information on the effectiveness of development initiatives. Lessons learned can often help set the signals for donor policy. (In several cases, of course, the donors have set the wrong signals with real harm to specific countries; had there been real discussion of the validity and significance of evaluation reports, these problems might have been avoided.)

The first parts of this paper are a discussion of the main evaluation conclusions drawn by donors on development in general and on agricultural research in particular. Next follows a discussion of how donor evaluation concerns can better serve the interests of reinforcing local public administration.

Main Conclusions

It must first be said that evaluation work by donors has now become very wide spread. Among the bilateral donors "most donors evaluate roughly 10–20% of their projects annually" (OECD 1985a,b). With the exception of the African Development Bank (ADB), the major multilateral development banks generally have well-established evaluation systems (see U.S. General Accounting Office 1986). Fairly rapid growth of evaluation systems in the operating agencies of the United Nations system in recent years has spread evaluation coverage from 12 agencies in 1981 to 21 in 1985, with the remaining three not needing real systems (Sohm 1985b:3).

It is not an exaggeration to say that by now donors have conducted thousands of evaluations in the Third World. The great majority of these have been process evaluations, but an increasing share emphasize impacts. Most of these evaluations cannot be compared with great accuracy across donors, sectors, and countries, given the multiplicity of donor evaluation systems. Since 1980, however, there have been selected attempts to do this based on fairly successful accumulations of evidence from evaluations conducted by some donors of their sectoral or country experiences or both. Two important sources of information on cross-donor evaluation results are the ongoing work of the Expert Group on Aid Evaluation of the Organisation for Economic Cooperation and Development (OECD) Development Assistance Committee (DAC) and the now completed work of the World Bank International Monetary Fund (IMF) Task Force on Concessional Flows.[1]

Because the work of the Task Force is by far the most comprehensive assessment of donor-financed development ever undertaken, it is worth noting their two main conclusions:

> Most aid has been productive and helpful to development . . . the overall aid record is comparable to that of many large domestic programs in industrialized countries. . . . Vast numbers of poor people have benefited from programs designed to alleviate poverty in rural and urban areas . . . [but] . . . There is considerable room for improvement in the way in which aid is provided by donors and used by recipients. Effectiveness can be increased by donor policies and procedures (for example, greater awareness of the impact of donor aid and economic policies on the development prospects of recipient countries; learning from their own experience and those of other donors); recipient actions such as institutional and policy reforms; more effective dialogue, where needed, between donors and recipients on policies and actions needed to promote development; and better coordination of aid by donors and recipients (World Bank 1985b:3–4).

By professional inclination, evaluators seem slightly more satisfied with finding problems rather than dwelling on successes (and indeed this paper will be guilty of this). As a result, it is worth spending a moment to try to account for the successes found by the Task Force. Among the macro effects of donor assistance, the Task Force found that aid adds to economic growth; helps to lower poverty, especially through agricultural projects; has a positive rate of return; and outperforms general economic progress in most parts of the world (World Bank 1986a:23–44).

These findings run counter to the arguments behind the "aid fatigue" found in both the North and South. The public impression is that aid fails, even in countries that are doing well — almost as if countries succeed in spite of aid. Anti-aid groups will probably discount the findings of the Task Force because it relied upon the evidence of the donors, and this evidence, critics sometimes contend, may well be skewed in favour of the donors. Although there is some truth to this, I have also found that several of the donors are harder on themselves than on their counterparts in the Third World. In fact, the Task Force went to great lengths to weigh evidence carefully.

One is left with a systematic assessment showing such evidence as that found by the World Bank indicating that 79% of the 504 projects evaluated as of 1982 had a rate of return of 10% or better and an average of more than 17% (World Bank 1986a:40–41) Two-thirds of Canadian projects evaluated over the 1981–83 period were found to have positive impacts on intended beneficiaries, with 30% having negative effects, (World Bank 1986a:42). In general, donors can be expected to show a good two-thirds success rate with the remaining third split between salvageable projects and write-offs. (For a fuller discussion, see Berg [1986:514–530].) That is the good news.

More difficult to accept (for all parties) is the bad news. Donors have found a number of problems in projects and programs with which they have been associated. Even the "successful" projects and programs often have evidenced some of the following problems.

In general, donors bring to projects and programs they help finance far better economic and technical skills than institutional and socioeconomic skills. This is true for almost every type of assistance provided, be it projects, programs, structural adjustment policy-based programs, IMF programs, or sectoral assistance (Berg and Bergen 1985:3; USAID 1985b:iv). Evidence of donor "success" is far better in sectors with a minimum of difficult sociocultural and institutional problems (e.g., rural roads) than with sectors where these factors are almost overriding (e.g., programs involving pastoral peoples). World Bank studies have shown only one-third to one-half of institutional objectives being fully met (World Bank 1986a:46).

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[1] The Task Force on Concessional Flows was created by the Development Committee of the Boards of Governors of the World Bank and the IMF. Under the chairmanship of Professor John P. Lewis, representatives of 18 nations (nine from the South and nine from the North) approved the issuance of a report reviewing the quality of past aid and the requirements of future aid. The two reports of the Task Force so far published by the World Bank are noted in the bibliography. The main work on aid effectiveness arising from the Task Force was analyzed and compiled by Robert Cassen and Associates (Cassen et al. in press).

Some donors report a real problem in technology transfer activities. This has been "particularly serious . . . in Africa and the Near East, in the countries of South America with large Indian populations, and in Central America" (USAID 1985b:19). It is interesting that this problem appears to arise where the donors have less knowledge of local peoples.

Donor-assisted projects and programs have shown difficulties in sustainability, replicability, and spread. These key tests, too often unplanned for in any case, are a particularly severe criticism of the many "model" and "pilot" projects fostered with donor help that in fact often lead to little else even when the experiment has succeeded. In fairness, governments (donor or otherwise) often have to sell proposals as being a "model for the whole country" to gain funding for what might more realistically be seen as a worthwhile local project.

This same factor of perhaps necessary oversell accounts for a number of implementation findings that are regularly seen in donor evaluations: almost predictable time overruns (often attributed to the complexities of dealing with donor regulations, particularly when procurement is tied); cost overruns in a significant number of cases, and often associated with these problems and a host of other factors, a failure to accomplish the entire quantity of physical goals of the project or program.

Given these kinds of problems, there is a need for flexibility in adjusting activities to new realities. Yet too often donor evaluation reports mention the lack of flexibility as a problem in carrying out initiatives. This has led some to advocate a learning model approach to build in flexibilities. This eminently appropriate idea, however, runs counter to the view in many donor agencies that project plans should be carried out to the letter. Other major lessons relate to the need to target programs for specific beneficiaries (generally conceived to be the poor within specific areas) to ensure that they receive intended benefits, paying better attention to maintenance and other recurrent costs and to frequent suggestions that activities be better coordinated with similar endeavours.

An emerging literature is also developing from the evaluations done by the nongovernmental organization (NGO) development sector. (See, for example, the paper by van der Heijden [1985], which brings together the results of several studies.) It has been usual in many of the donor countries to discount the importance of the NGO experience, but in some countries this can no longer be done. In several of the OECD countries, these organizations have considerable influence on public opinion and parliamentary matters pertaining to aid. Indeed in the U.S., the NGOs now raise more monies independently than the U.S. goverment spends on nonpolitical aid. Furthermore, in several Third World countries, the NGO contribution (both national and international) is getting to be significant both in terms of impact and in terms of being willing to work in areas of countries difficult for governments to reach.

Important evaluation findings from the NGO literature verify that most of the NGO effort is for developmental rather than relief tasks. A number of these organizations are taking on activities of considerable scale and are having a commensurately larger impact. Some extraordinarily innovative work is going on under the auspices of NGOs. Their record of fostering participation is far better than for official donors, yet for some reason income-generating schemes are problematic for a good many NGOs. Contrary to official donors, the NGOs demonstrate good flexibility, but their work, too, raises a whole set of collaboration questions involving relations with each other and with governments.

This too rapid review of the general conclusions from donor-sponsored evaluations does not do justice to a significant literature. The fact that this literature (e.g., annual compilations of evaluation findings by the major donors, analyses by country, by sector, and by type of problem) is becoming more accessible means that it may exert an influence in many settings. It may become yet another donor force exerting influence on Third World agendas. Of course, to the extent that this literature reflects authentic Third World experience and realities, this is all to the good. One does not know how good the "fit" is, however, because there is not a comparable literature by Third World evaluation authorities in sufficient volume to compare. Thus, donor evaluations may enjoy an advantage simply because they are more visible and have generally arrived early.

For the most part, however, the literature of donor evaluation does not include an analysis of the lessons learned in the public administration of the evaluation process itself. That is a pity. Several donors have experimented with various types of evaluations, several have run training sessions for their own nationals and for others, and several have a good deal of experience with attempting to get the findings of evaluation respected and adopted. As donors move to help Third World nations establish their own monitoring and evaluation systems, it would be good if they took time to first reflect on the lessons they have learned in establishing and operating evaluation systems, and in seeking to ensure that these systems have influence.[2]

Conclusions of Donor Evaluation on Agricultural Research

It is pertinent to review the evaluation evidence on agricultural research compiled by the donors. The donors have beeen active participants in the movement, which has expanded the agricultural research activities of Third World nations by more than fourfold in the last generation. (The number of agricultural researchers in developing countries increased from 14700 to 63000 in the period 1959 to 1980 [CGIAR 1985:15].)

Because the evaluator is concerned with final impacts and results, it is extremely difficult to restrict a discussion of the results of agricultural research merely to the research itself. The systems of extension, provision of inputs, marketing, and macropolicy influence so much of the outcomes that it is difficult to disaggregate effects, particularly if they happen to be positive!

Turning again to the Task Force on Concessional Flows, their major finding regarding agricultural research is as follows:

> The effectiveness of technical cooperation in agricultural research — one of the few technical assistance endeavours that lends itself to rate of return evaluation — has been "exceptional and well documented." A 1979 study of aid-funded agricultural research projects in eleven countries found rates of return averaging about 50 percent and ranging as high as over 100 percent. A UNDP/FAO evaluation of ninety-two national agricultural research assistance projects covering the period 1970–81 reached the conclusion that they had produced "major benefits" for farmers (World Bank 1986a:46).

Given their key role in agricultural research, it is worth reviewing the evaluation evidence pertaining to the Consultative Group on International Agricultural Research (CGIAR). A major review has recently been concluded (CGIAR 1985) that involves a number of important subsidiary studies covering both the CGIAR and national research efforts in country cases. The basic conclusion of the review was almost euphoric (e.g., ". . . it cannot be overstated that the work of the centres is of benefit not just to the developing countries" (CGIAR 1985:3). But the evaluation also pointed out the relative lack of success in sub-Saharan Africa and the need to change emphasis in a number of areas from highly applied to more basic research, particularly in molecular genetics (see also Jahnke et al. 1985).

The key conclusions of the study were that the centres were essential; that a good deal of the economic benefits from them could be traced to wheat and rice work but that major benefits would be forthcoming from maize and field beans work; that benefits were fairly evenly distributed between farmers working differing scales of landholdings and tenure status; that the centres' major roles were needed well into the future; that the centres had raised the capabilities of thousands of research personnel through training programs; that, although farm systems research had grown, the problems of women farmers had hardly been touched (Billing 1985:142); that the centres' work on policy was having a beneficial impact; that collaborative research arrangements were having a good effect; but that "for many centres, the challenges that they face are so perplexing and the constraints imposed by poor infrastructure, depressed commodity prices, lack of agricultural inputs, and low levels of knowledge so difficult that it is too soon to expect impressive returns from their work" (CGIAR 1985:3–4). (For in-depth country analyses of these findings, see also Pray and Anderson 1985; Stewart 1985a,b.) A fair amount of the evaluation literature involving the international agricultural research centres (IARCs) aims at pointing out where these centres can be expected to make their contribution and where the national and local research centres make their best contributions.

The major contribution of the national research centres is stated to be their ability to ensure implementation of research findings especially as they pertain to the countries' development needs. With very few exceptions, the majority of national research centres in developing countries are seen in these evaluations as hampered by national development constraints and are, thus, unable to perform their duties efficiently. Apart from research, therefore, the bulk of the work done by the IARCs is described as improving the research capabilities and organization of these centres.

The World Bank and United States Agency for International Development (USAID) have conducted the most extensive assessments of their own evaluations on agricultural research projects, a great number of which involve(d) national and subregional centres. The Bank's review of its evaluation findings on agricultural research and extension (World Bank 1985a) is "must" reading. This review was of evaluations of 128 projects in 10 countries covering the 1974–80 period.

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[2] One of the more interesting case examples is found in Owen and Jones (1985:47–48) in their description of how a major NGO evaluates food-for-work programs in India. Four levels are involved: local review of "asset effectiveness," review by consigness to consider alternative approaches to reach the same goals; review on a zonal basis, particularly to see what qualitative factors need to be given more recognition; and review at the national level to compare the effectiveness of different approaches.

One would want to learn from a critical analysis comparing this and other approaches. But the point is that there is much to learn in terms of approval and effectiveness from active systems of evaluation taking place all over the world.

The review found that regardless of the approach followed in the countries studied, the level of research and extension activities needed to achieve development targets far exceeded the levels actually provided. There were extensive inadequacies in resource allocation to and between research and extension, reflecting weaknesses in planning and monitoring. Poor monitoring had led to a duplication of research activities within and between countries and the IARCs had resulted in a lack of accountability for and concern about the use of research results. (Yet, even though the Bank promoted the establishment of monitoring systems it had not transferred its own project supervision system into a monitoring process.) In addition, there was often greater concern with the quantity of resources allocated than with the effectiveness and impact of their use.

Regardless of the approach followed, the Bank's support for research and extension was constrained by five factors: a lack of clarity in country objectives for agriculture and in priorities among objectives; limited input by the country in the design of Bank-supported programs; limited work on other issues affecting the success of research and extension, such as sector and macroeconomic issues; problems with the institutional separation of research and extension; and a lack of clarity or agreement on the definition of various stages in the process of technology development and transfer. The more successful research organizations in the 10 countries studied displayed some or all of the following characteristics: a strong central organization responsible for most aspects of national research and backed by sufficient funds; some degree of autonomy from the bureaucratic structure of the Ministry of Agriculture; good links to national planners and policymakers; service units, part of or related to the central research organization, which perform important planning, monitoring, and evaluation functions; planned decentralization or regional research; and active participation in translating research results into recommendations for users.

The Bank recommended greater assessment of social, political, and cultural constraints to ensure that projects are more consistent with sociopoliticocultural realities, it recommended greater insistence on the active participation of borrowers throughout the project cycle, and it urged less emphasis on uniform approaches to research and extension. Subsequent World Bank reflection on its evaluation experience in agricultural research has questioned expensive evaluative methodologies often used by the Bank to measure yield trends, recommending that major emphasis instead be put on monitoring adoption rates (World Bank 1985c:47).

In pointing to the future, the evaluation evidence suggested that the Bank and national governments should emphasize manpower training, particularly of research program leaders; development of the functions of research management and research on agricultural activities in low potential areas; research that helps integrate crop production and livestock activities and improves farm management; and consideration of social, economic, environmental, and political factors in doing all projects. This gem of a report has been quoted at length as it has so much to offer. But more than that it demonstrates the range of findings that good summative evaluation work can provide. It also touches on many themes found in other evaluations undertaken by donors.

The Bank's most serious criticisms have been leveled at agricultural research in Africa (World Bank 1986b). The Bank has found research there to be of very high cost (about double the level per scientist year than in Asia), with researchers isolated, demoralized, or siphoned off into administrative roles, and institutions weak because of underfunding of both recurrent and capital costs and lack of political backing. Other evaluation critiques centre on the mix of crops chosen for research — a particularly critical question now that CGIAR has decided to allocate 40% of its resources to African agricultural issues.

USAID's evaluative review of agricultural research projects (Murphy 1983) was based on a literature search of in-house evaluations (as at the Bank) and a set of specially commissioned impact evaluation studies carried out by a combination of USAID and consultant experts. The study found that AID projects had successfully trained researchers, established or expanded research facilities, and, in several cases, increased agricultural production. The impact and sustainability of the projects, however, were hampered by management problems; inadequate coordination of research, extension, and agricultural service activities; insufficient understanding of the needs and capabilities of practicing farmers; and unfavourable government agricultural policies. Among USAID's recommendations aimed at itself were that assistance should be very long-term, preferably 10 years; be integrated into the whole assistance strategy; often be backed up in the country by local donor staff; be implemented through a government entity that can coordinate its activities with those of related institutions and programs; and be better at integrating training outside the institution to complement on-the-job training.

These donor evaluation findings could be expanded upon to cover such donor concerns as farm systems research, a large literature on extension systems, a literature concerned with why agricultural research and extension systems often do not reach small and poorer farmers, etc. (Cassen et al. in press). It is enough to say, however, that this donor evaluation literature is extensive (not only in the sectors under consideration, but in many other sectors as well) and that the donors are only in recent years assessing this literature for summative lessons. One looks not only to the major donor agencies but to the OECD/DAC for further contributions to bringing this literature together.

Increasing the Utility of Donor Evaluation

It is important to examine whether this literature has had any impact on thinking and action in the Third World. What do these evaluations mean? Are they an abstract set of findings that may have a passing relevance because of their authorship? Are they bound up in the culture of the donors and, thus, to be distrusted? Have they defined even the questions to be evaluated correctly let alone whether the answers are "correct?" In essence, should they be seriously considered on their merits?

In some parts of the world, donors represent a very significant share of development investment (in normal years 44% in nonoil exporting sub-Saharan Africa and in recent years considerably higher). Even in those areas of the world where the donor flow is relatively modest, for example, in India and China, the influence of major donors on policy questions can sometimes be large. One would think, as a result, that the size and policy leverage of the donors would be a clear indication of the power of their evaluations. This, however, is not the case. In fact, the impact of donor evaluations has been far less than might have been expected, and this has been of concern to the donor evaluation community.

Within the donor community, evaluations have played a role varying from very modest to modest. If they had played more of a role, we would have seen more portfolio changes and probably the adoption of a concept of differentiated risk whereby areas of donor activity with a high risk of success would receive considerably more supervision, monitoring, and evaluation than areas with low risks of failure. Instead, portfolio adjustments resulting from evaluation evidence have been modest, and donors tend to have a fairly uniform approach to quality control steps, regardless of the risks involved.

Donor evaluations are often crippled as they are frequently "helicopter" operations: drop in and fly out operations conducted by donor and other foreign staffs. This despite the fact that "host country participation is essential for meaningful evaluation" (Murphy 1983:48) let alone for meaningful utilization.

Donors have often been cautious about sharing evaluation evidence. In fact, it was only in 1981 that donors began to systematically share evaluation evidence with each other and even now most donor evaluations are not openly available.

It is time to draw several of these points together: donor evaluation evidence points to consistent problems with sociocultural and institutionalization factors, agricultural research programs are found to suffer from these factors and from the need to link them better with larger policy questions as well as with extension and other farmer response "reality" checks; and donor evaluations are only modestly influential in their own institutions, and there is still some debate on the extent to which "host-country" officials should be involved in the evaluations (as evidenced by the fact that donors still need to exhort themselves on this point).

Despite the foregoing, donor evaluations are relatively well received in Third World agricultural research establishments. This is because these establishments have a commitment to judge evidence on its merits, a similar concern with systems, a generally wider recognition of the necessity of appropriate policies as well as of programs to reach farmers, and the realization of continued need in many cases for further donor involvement.

To the donors concerned both with improved agricultural research systems and with improved use of evaluation, the issue really is how to operate donor evaluation activities so that they most benefit the long-term growth of quality systems and institutions thoughout the Third World. There is only one logical route: good monitoring and evaluation systems need to be established in these areas as acceptable systems become established. Donors now "impose" their own in-house monitoring and evaluation activities regardless of whether or not good local capabilities exist. This obviously does not offer much respect and attention to these local capabilities. A better approach would be one in which donors indicated their professional respect by utilizing the local product rather than substituting their own work for the local product.

Given the extremely active monitoring and evaluation activities of donors, it is hoped that host countries will accord due consideration to these activities. But they should also consider how to co-opt these activities to encourage a transition from donor to local monitoring and evaluation. I hope my old colleagues in the donor community do not consider the recommendations that follow "A Subversive's Guide to Capturing the Donors." It is a guide, nonetheless.

(a) If there are ongoing donor involvements, and it has already been agreed that the donors can monitor and evaluate activities associated with their assistance, there are several things that could be done to enhance the outcome of the evaluations:

- Attempts can be made to preempt the donor's agenda by saying, in essence, "because you are going to do the exercise it might as well have issues in it of interest to us." The issues given the donor might include questions on which an outside view could prove useful leverage for internal discussions and negotiations.
- If more than one donor is involved, suggest that they coordinate monitoring and evaluation work to save everyone time and costs, but be sure that the most responsible and professional donor has the lead.
- Insist that local staff be associated with key teams.
- Insist that teams be briefed by responsible local officials before fieldwork begins to ensure that the scope of work is clearly understood by all parties and that the team is aware of any relevant monitoring and evaluation work, particularly by the host institution.
- Ask to be consulted if the team finds itself in a dilemma — it is best to guide the team when they have a problem lest they guess at a solution.
- Be firm in asking for a draft of the team's report and a debriefing (in that order) before they leave the country. This should come before any higher level briefings are even contemplated by the team.
- Formally request a final copy of the report, and be sure this is agreed to.
- If the report in draft or final form calls for a series of actions that are acceptable, particularly if these actions are to be performed by the donor(s), ask for a negotiated timetable for the recommended actions. Even if one can only negotiate a proposed time table, it helps transit the evaluation to follow-up actions.

(b) If donor involvement is new and there is a modest or weak in-house monitoring and evaluation capacity, part of the assistance package should be geared toward helping establish or strengthen local monitoring and evaluation capabilities. The unit(s) involved must be committed to this task in a way that will enable them to take on specified tasks (at agreed points in time) that otherwise would be performed by the donor(s).

(c) If the aided institution or ministry has a good monitoring and evaluation capability, insist that this fact be recognized in the project or program appraisal report. Insist further that this institution(s) be given the responsibility to monitor and evaluate the aided program. If the donor appears uncertain about accepting this, suggest that a donor-provided technical expert be a part of the local monitoring and evaluation team(s). A donor can always reserve the right to evaluate an activity should the local evaluation be considered superficial or otherwise defective; however, the point is that the donor should be made to recognize and utilize local monitoring and evaluation capabilities to the fullest extent possible.

Helping Institutionalize Management for Quality

What Donors Have Done

A few of the bilateral and multilateral donor institutions are helping to change the old ways of donor monitoring and evaluation (which at the very best covered only about 10% of the development endeavours of the Third World). The aim is to help institutionalize monitoring and evaluation systems so that the impact of such endeavours has much broader and longer term effects. This public administration approach to monitoring and evaluation is notable in the major donors. Other donors are also involved in helping establish evaluation units in special sectors and on a case-by-case basis.

Not all of this experience has been positive. There has been overinvestment in some cases (particularly in monitoring systems) and failures to have a good understanding of political and institutional factors sufficient to ensure real changes in public administration behaviour. But the key point is that in the last few years the donors have been giving a lot of attention to monitoring and evaluation systems, and this is a development that can only be encouraged both as a program of assisting improved public administration and as a step often necessary to phasing out the donor's own monitoring and evaluation activities.

It is important to understand why donors have helped Third World governments develop monitoring and evaluation capabilities. Some have done so because they believe that monitoring and evaluation are an essential part of any project administration, thus, project authorities have been given units with often unusually numerous staff resources and functional tasks. A great many development projects are seen as hypotheses that need to be tested either because the people involved are at risk or because if the project is truly successful other follow-on activities are planned. Projects and programs with monitoring and evaluation functions as part of their administration encourage more flexibility in their administration (Owen and Jones 1985:6) and are, thus, more likely to be successful experiments or good regular programs or both.

A number of the donors seek to involve host-country officials (most often at the project or program director level) in the conduct of specific evaluations mandated by the donor and carried out largely by the donor. USAID is said to involve counterpart governments in 60% of its formal evaluations (OECD 1985a,b). UNICEF conducts annual "program implementation reviews" in roughly three-quarters of the 108 countries where they have programs, most often in collaboration with host governments (Sohm 1985a:8).

But over and above considerations of validating the effectiveness of what the donors finance, some donors regard developing a local monitoring and evaluation capability as an essential way to ensure that the right questions get asked of the programs in which assisted activities are situated. Often donors are involved with only a slice of an activity and often restrict their own monitoring and evaluation activities to that slice. (I once visited an agricultural training centre that had the support of four donors; each came on occasion to monitor or evaluate "their" building. No one was looking after the effectiveness of the whole centre.) A local review capability can frame the questions more correctly as they are more likely to have the context defined in the local reality, not a set of external realities.

The need to obtain higher levels of internal reality have led some donors to be concerned with more thoughtfully identifying the public administration reality of programs and projects they are assisting. This has led them to worry about how quality lessons reach higher authorities; hence, they have become involved with monitoring and evaluation functions at higher levels of government.

Donors are now encouraging each other to institutionalize evaluation. The summative work on evaluations by such groups as the Task Force on Concessional Flows has pointed to the value of learning from past experience and led groups like the World Bank to encourage "donors and recipients . . . to increase their capacity to learn from their own experience and that of others . . . ." (World Bank 1985b:4).

What kind of donor help has been offered by donors in helping establish monitoring and evaluation units? The range is great because the number of donors active in this field is relatively large. They include various agencies of the United Nations, the World Bank, USAID, the Canadian International Development Agency (CIDA), the Overseas Development Administration (ODA) of the United Kingdom, the Swedish International Development Authority (SIDA), the International Fund for Agricultural Development (IFAD), and, of course the International Service for National Agricultural Research (ISNAR). Other donors are taking more vigorous steps to foster joint evaluations with other donors (e.g., West Germany), a small step in the right direction, and a good number of the donors try to involve local authorities in their own evaluations. In addition, both the DAC and the U.N. General Assembly have taken steps to legitimize these activities among bilateral donors and U.N. agencies, respectively.

Installing monitoring and evaluation units at the project (i.e., local institutional) level is the most frequent approach of donors to further local-level monitoring and evaluation. Installing such units has been a common feature of many of the projects of the major multilateral and bilateral donors. Sometimes, as with the World Bank, such units have as an important responsibility the conduct of evaluations stipulated by the donor (e.g., the Bank's Project Completion Reports). More often the units are to carry out monitoring and evaluation activities described in the project agreement or project plan. Donors use project-level agreements to assist sponsoring ministries to set up evaluation units. For example, in 76% of the World Bank's projects with monitoring and evaluation requirements, help for such units was included in the project agreement (World Bank 1985c:15). IFAD also has been notably active in this approach; they set up monitoring authorities at the project level and strengthen evaluation units at the ministerial levels in connection with the agricultural projects they support.

The Food and Agriculture Organization of the United Nations (FAO) also has become quite active in assisting ministries and major project units to improve their evaluation systems. As of 1985, FAO had provided assistance to 13 countries in the design and operation of monitoring and evaluation systems at either the project level or the national agricultural ministry level. Eight seminars/workshops specifically on monitoring and evaluation have been held in five countries, with more planned (Sohm 1985a:20). The World Food Programme is also launching similar activities (Sohm 1985a:32–33) with 1985 activities extending to 15 countries (Sohm 1985b:27).

The United Nations Industrial Development Organization (UNIDO) calculates it has trained 250 government officials in evaluation and monitoring in this sector of interest (Sohm 1985b:27). The International Labour Organisation (ILO) has also been quite active in training and offering technical assistance. The United Nations Educational, Scientific and Cultural Organization (Unesco) and the World Health Organization (WHO) are involved in training programs on evaluation. All of this has been with the active encouragement of the U.N. Joint Inspection Unit, which has actively pressed most major U.N. agencies to institute technical assistance and training programs. Both kinds of assistance have also been provided by the World Bank and, from time to time, by USAID

The donors have also been active at a still higher level, developing national evaluation systems. First, there have been efforts merely to give international recognition to the existing central evaluation authorities. This process was started by USAID in 1981 with the publication of a directory of central evaluation authorities (USAID 1981). Following a call by the U.N. General Assembly for "assisting developing countries, upon request, in developing their evaluation capacity" (47th session, resolution 38/171, 19 December 1983, see Sohm 1985b:26), the UNDP issued an update of the directory in 1984 (UNDP 1984), which covers a good many more Third World countries. It is significant that the OECD/DAC actively contributed to the second directory as part of its own recent emphasis on assisting Third World evaluation systems. The first directory covered 92 country listings, largely Third World nations, but also included several of the OECD donor evaluation systems. The UNDP directory covered 154 Third World and some Eastern European countries. Both list evaluation authorities in the U.N. system.

Donors have also extended assistance to national evaluation units in a number of countries; CIDA (Canada) provided help to the Government of Kenya's Ministry of Planning in the early 1970s. USAID has ongoing work with Niger. The World Bank is actively working with China and Mexico. SIDA (Sweden) has helped a number of countries in East and Southern Africa. These are but a few examples of a number of major commitments by donors to help countries at the central level.

Institutionalizing Monitoring and Evaluation

With a significant and increasing level of donor involvement with enhancing the evaluation capabilities at the project, sector, and national levels, it becomes possible to hazard some impressions on how well these important kinds of interventions have been working out. In brief, the results have been highly mixed, with some evidence of a bit more failure than success.

At the project level, donors have reported generally satisfactory relationships in jointly conducted evaluations. Donors seem to gain a good deal from such exercises, and evaluations tend to lead to actions. These exercises are almost always process evaluations that indeed do lend an action orientation to them.

Donors feel that building evaluation requirements into projects is a good incentive to help institutionalize evaluations, but the donor standards have too often been relatively extravagant, utilizing high numbers of trained people, generating mountains of data and often lacking timely or sometimes even processed data (OECD 1985:49). Clearly, built-in requirements need to be reasonable, and a good check is to see what formal requirements already exist in the sector.

The donor that has most systematically tried to obtain its required reports from recipients has been the World Bank, with decidedly mixed results. The Bank has aggressively pushed host-country involvement to compile its Project Completion Reports, which have many evaluative elements. World Bank senior staff are concerned that this practice is not working out too well. Only 40% of the reports are done by borrowers, and of these only 30% (i.e., a total of 12% overall) are acceptable, the rest usually have to be redone by Bank staff to meet internal requirements. Nonetheless, the Bank reports that a number of their major borrowers have the capability to prepare fully not only Bank completion reports, but their own centralized postevaluation reports. These countries include the Philippines, Korea, Indonesia, India, Pakistan, Bangladesh, Tunisia, Tanzania, Colombia, Yugoslavia, and Mexico (World Bank 1985c:23).

As one moves to the donor record of fostering monitoring and evaluation units, one looks again to the World Bank because it is the only donor to have systematically assessed its record. Fortunately, for this conference, the Bank has recently assessed its experience in the agricultural sector. The record of fostering monitoring and evaluation (M&E) in 104 agricultural projects in the 1980–84 period was as follows:

> The performance of M&E has been assessed positively in 15% of the 104 projects, mixed in 39% and negatively in 46% . . . Built in M&E should be finalized at an early stage in the project cycles; these designs should be clear and reflect modest/realistic objectives: and adequate staff resources for operating monitoring systems and for undertaking evaluations should be provided for . . . Efforts should be made to determine the impact of monitoring projects' overall performance as well as the intrinsic value of evaluations, and to devise and implement measures of cost-effectiveness for these activities. . . . The combination of poor past performance of M&E in agricultural projects, relatively weak efforts by the Bank's operational staff to promote it and insufficient borrower support for M&E point to the need for a major restructuring of the Bank's effort with respect to project monitoring and evaluation. (World Bank "Built-In Project Monitoring and Evaluation: An Overview" Report No. 5781 dated June 28, 1985, summarized in World Bank 1985c:67–68.)

Looking behind these decidedly mediocre results, staff who work on these problems say that donor involvement is often too short, with pressure to find results in as little time as 3 years. Often, too, an inordinate amount of attention is spent in the pursuit of evidence on higher level impacts to the detriment of more mundane but essential local-level indices of change (i.e., adoption and drop out rates). Finally, the use of university staffs by some donors to help set up monitoring and evaluation systems leads to a research rather than a "real world" approach in some cases. One is left with the impression that too often built-in project level systems imposed by donors are meant to meet donor-defined requirements and not local needs.

To a certain extent, this problem seems to be at least as serious when donors help establish monitoring and evaluation capabilities at higher levels of government. This is particularly true when systems fostering ex post evaluations are attempted. A telltale indicator of this problem is that "while donors have begun to invest more resources (at these higher levels) in evaluation in the past few years, recipients typically have not" (OECD 1985:47).

At its worst, one finds a number of instances where the donor virtually ran a ministerial or central evaluation function that did indeed operate — but only as long as the donor ran it. Canada experienced this in Kenya. When Swedish teams left, units they were helping reverted to planning functions (Johansson and Paues 1984). ISNAR feels that this apparent lack of interest in evaluation extends to the field of agricultural research where it is held that few countries are evaluating their own systems (Murphy 1985:1).

What then is one to make of a system that works fairly well when there are joint process evaluations; has had more failure than success in building project monitoring and evaluation units; has a great deal of activity at the sectoral level with mixed but increasingly improved results; and that has a mediocre level of success at the central levels? Donors themselves think they have oversold the idea of help to the central level and that perhaps they need to think more about help at the sectoral/line ministerial level. There is some thought that only when one has a good foundation at the line ministry level is it worth attempting to set up central units.

It is obviously difficult to generalize across many levels and numerous countries, but these hypotheses are suggested:

- Too often the supply has preceded the demand. Donors in their commendable new-found interest in inculcating monitoring and evaluation have in a number of cases moved ahead of local interest.
- There is indeed a sharply growing interest in the Third World in monitoring and evaluation, but that interest must be met where it is, not at some externally defined level. Where that interest is met and supported, there will then be not only a better chance of success, but also a chance to move to, for example, ex post evaluation at some more appropriate time.
- The donors have had reasonably better succcess in joint evaluations and, thus, should themselves be adopting the guidelines (which in fact are not "subversive" except to those uninterested in transferring evaluation thinking to local levels) presented earlier. Joint experience, informal seminaring, and the like can better inform the donors on what local interests really are in monitoring and evaluation and can also expose the host authorities to what the donor has to offer. This can help both sides make a more professional choice as to whether to work jointly on institutionalizing monitoring and evaluation functions.
- The history of much donor involvement has been for donors to impose requirements and then for local governments to take these on as their own. Clearly, this process will have a better chance of working if the donor requirments are realistic from the start.

Future Directions

There is much to be done by both donors and Third World countries if they are to cope with the continuing resource constraints they both face. Obviously, people in the donor groupings and in the major donor organizations have given a great deal of thought to their future evaluation work. The key point, however, is that the Third World has not yet been in a position to organize among its evaluation authorities to put forth its agendas. If it were possible for donors and Third World evaluation authorities to gather in one or more groupings, it might be fruitful for them to include discussion on some or all of the following eight suggestions for future international cooperation.

(a) Cost-efficient ways of aggregating experience on a country basis, sector-by-sector, and perhaps area by geographic area, need to be developed. Here authorities would confront the problem that evaluation results are often held by a large number of external authorities that rarely share evidence with the local government and when the sharing takes place, it is most often at low levels covering the results of only one evaluation at at time. Numerous evaluation systems are used so aggregation is difficult. Furthermore, usually, and most unfortunately, the experience of private nonprofit development groups (both national and international) is not even thought of in attempting summative analyses. This is a fault to be avoided.

(b) Given the widespread evidence that sociocultural and institutional problems account for a large percentage of development failures, it would be good to identify ways of tapping local expertise in these fields to participate in various levels of the conduct and summative analysis of evaluation work. Donors and Third World governments have a common interest in working out this problem.

(c) Of critical importance would be the planning of joint seminars to review donor and host-country evaluation evidence. The need for real mutual collaboration is paramount if mature relations are to be fostered. No better way exists in the field of evaluation to do this than to have a real sharing of results, dilemmas, and future agendas. The DAC at the time this report was written is considering sponsoring an experiment along these lines. One hopes it is perceived as less risky than seems to be the case now. Naturally, South–South sharing of such information would also be productive and may prove necessary if the DAC decides not to sponsor such a series.

(d) There is a real need to have candid discussions on the public administration lessons learned in attempting to institutionalize monitoring and evaluation systems. The experiences that have taken place so far have had such mixed results that real efforts are needed to prevent wasted time and talent in the future. What is really missing in the discussions is how to find ways of using monitoring and evaluation information as incentives for improved public administration. This calls for a candor in discussions not often seen up to now. To foster productive discussions will necessitate settings for meetings on this topic very different from the usual ones. One thinks of private foundation auspices as a possibility.

(e) It would be interesting to share problems. Both donors and national authorities have constituencies to serve, but neither seems to know well what the demands of counterpart constituencies are. How can donor and host-country evaluation systems serve each other's needs? What can the donors do to help gain respect for local monitoring and evaluation authorities? How can the donor evaluation process wind up providing real resources to local monitoring and evaluation authorities? For example, would it be possible (assuming that a donor team "must" come) for them also to undertake a review of a nearby activity of keen interest to local authorities? Sharing agendas and problems, if done in an atmosphere of trust, can prove mutually beneficial. But the donors must expect candor, too. How would they react, for example, if the host country were to ask: "Would it be possible for donor X to review the work of donor Y, because we think that donor X does a much better evaluation job?

(f) Real discussion is needed on how to synthesize approaches and perhaps systems around a national approach that has donor respect. It is folly for large donors to expect national governments or other donors to fall in line behind their particular monitoring and evaluation systems. What is needed is for donors to fall in behind acceptable local systems. This does not necessarily mean that there must be 150 national systems. Hopefully, perhaps with donor help, national governments can become more aware of the food monitoring and evaluation systems in the Third World. Donors and Third World countries can then adopt practices from each other thereby reducing the number of systems around.

(g) Neither donors nor Third World evaluation systems pay much attention to audit authorities. In many cases, this is a mistake. Local or donor auditors, or both, can be key evaluators to major problems and at best provide augmenting quality control systems. The question is what systematic lessons have auditors learned that evaluators also ought to learn. It is hard to know now because two communities are not in touch.

(h) These systems are now producing a wealth of information and promise to increase the data flows at a high pace. In similar situations there is a call for data banks and for organized data sharing; perhaps on interactive bases. It might be worth contemplating a future data bank among sectoral and perhaps national evaluators to which the donors might also contribute case or summative information. At some future gathering, it might be useful to confer with authorities from the Intergovernmental Bureau for Informatics about this.

These suggestions lead to a final one. When professionals in other fields have gained a certain amount of knowledge in a number of settings, they have found it useful to share peer knowledge on a more regular basis. This has led to the establishment of peer associations. One could perhaps structure a society along the lines of the International Organization of Supreme Audit Institutions for central evaluators, with special sections for key sectoral evaluators.

If the problems were not so important, if the opportunities for public service were not so great, and if the stakes were not so high, the scale of these recommendations would be more modest. As it is, there is much to do and much that can be done. In carrying out the donor and Third World agendas for monitoring and evaluation let us hope that the essence of the donor role is observed. Donors are only true to their profession if they work themselves out of a role. As they do, their self-appointed task is also to be sure that they leave behind the best possible contributions to sustainable and honourable development. This is especially important in this field.

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Agricultural Research in Peru

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The objective of the study is to describe and analyze Peru's experience in agricultural research evaluation, with special emphasis on the Instituto Nacional de Investigación y Promoción Agropecuaria (INIPA's) work in this area. The intention is to determine what kind of economic, social, and political pay-off resulted from the efforts of the nation's public sector with the support of international institutions providing financing, grants, and technical assistance. The study begins with a description of the national system for agricultural research, and the institutional resources for research. Next, it describes INIPA's institutional and operational mechanisms and procedures for agricultural research evaluation, also presenting the structure of the institution and its planning and monitoring systems. The characteristics of INIPA's experience in evaluation are presented in the following section. This characterization is made in terms of types of evaluations, who, how, when, and at what level is the evaluation performed; and internal and external evaluations. The study next presents a description and analysis of the main internal and external studies performed by, and for, INIPA on evaluation of agricultural research.

Before presenting its recommendations, the study analyzes and draws conclusions about the socioeconomic and political importance of having developed internal and external evaluation studies, and the utilization of their results, in terms of most important users; planning and resource allocation to, and within, agricultural research; and research management and limiting factors. Finally, suggestions and recommendations are made to improve the current monitoring and evaluating mechanisms, strengthen the relationships with other institutions concerned with agricultural research, and improve and accelerate the diffusion of the results obtained through the various internal and external evaluation studies conducted in Peru since 1984.

Investments made in agricultural research in many developed and developing countries have grown considerably, especially over the last 20 years. In addition to the reinforcement observed in the national institutions concerned with agricultural research in terms of human, physical, and financial resources, international financing and grant institutions have established a network of international agricultural research centres (IARCs). Generally, society has decided to funnel more resources into agricultural research than into other sectors of economic activity.

Perhaps as a result of their tendancy to imitate exogenous models, many of the developing countries experienced a growth in investment in agricultural research, in real terms, only after having invested heavily over many years in agricultural extension. The assumption was that two basic elements existed in favour of extension. First, that the human resources involved in the research and extension activities would have been prepared and trained enough to be able to operate efficiently. Second, that agricultural research would have already produced sufficient expertise to allow for its accumulation and storage, with a view to its widespread dissemination. Unfortunately, the relative degree of success and, in some cases, the failure of the extension programs of the 1950s and 1960s showed the assumption to be erroneous. When those countries truly accepted the fact that they had been mistaken they changed their policy of resource allocation and began to invest increasingly in agricultural education and research.

Inasmuch as public funds are generally in short supply and are insufficient to cope with the demand for investments and public spending, a mechanism is needed whereby those funds may be distributed among the various existing alternatives for investment. As a result, agricultural research, just like any other economic activity, is forced to compete for resources with other programs or projects that are financed from public funds. When that happens, a number of questions arise. Is it worthwhile to invest in these activities? If so, how much should be invested, where should the funds go, and how long should they be tied up? What are the economic social benefits of those investments to society? To answer these questions, a number of studies have been undertaken throughout the world since the close of the 1950s. Briefly, there are three basic issues of concern: the socioeconomic evaluation of the agricultural research, the allocation of resources for and within the agricultural research, and the contribution of the research to agricultural development and to economic growth.

In this introductory section a very important point must also be made. In reviewing the existing literature on the subject, one finds a definite distinction between the methods used and the evaluation studies made in the cases of agricultural research, education, and extension, which is evidently quite arbitrary. Actually, there is a very close interlinkage between research, education, and extension. No research program can be very good unless the researchers have ample grounding in the theory involved and have been trained to solve the practical problems of agriculture and of the farmers. Nor can a good educational program exist unless the teachers have been suitably trained, for it cannot rest on a study of the theory only, without the necessary empirical knowledge of the milieu and of the socioeconomic context in which the program is to be conducted.

Finally, a good extension program is impossible unless the professionals involved have received the necessary training and there is an ongoing flow of know-how keeping the dissemination process up-to-date at all times. Actually, what happens with most of the evaluation methods and studies is that they cannot effectively distinguish among the effects of each variable. Most of the studies that were made to evaluate the returns from agricultural research also implicitly include the returns from agricultural education and extension. The few studies that sought to separate the direct return from agricultural research had to accomplish this subjectively. It is precisely because of the lack of sufficient theoretical instruments that the lion's share of these studies attributed all of the benefits to research when, in fact, as a result of the close interrelationship between the three variables, a portion of the benefits would necessarily have to be ascribed to agricultural education and extension.

The various internal and external evaluation studies presented in this paper show that the public sector made a great effort from 1980 to 1985 to support the planning and execution of policies on agricultural research, education, and extension in Peru. In a certain sense the government's effort was directed toward reviving the boom experienced by the national system between the end of the 1950s and the beginning of the 1970s. That effort was reflected in a large series of provisions and actions that led to the creation and operation of a nonformal national system of research, education, and extension in Peru under the shared leadership of INIPA and the National Agrarian University (UNA).

INIPA's Research Programs

Toward the end of 1985, INIPA's agricultural research and extension activities were organized on the basis of national and regional programs, national support services, and a series of diversified programs. There are 10 national programs (6 national programs by product, 2 programs by system of production, and 2 support programs). The national commodity programs include rice, corn, potatoes, cereals, beans, and livestock (the latter includes both animal species and pasture and forages and the Small Ruminants–Collaborative Research Support Program [SR–CRSP]). The programs by production system include the Andean Agricultural Systems and Agricultural Research and Extension in the Jungle. The support programs are the National Agroeconomics Program and INIPA's National Program for the Development of Human Resources. The support services consist of laboratories, quantitative methods and analyses, artificial insemination, seeds, and agricultural machinery. The regional programs deal with vegetables, fruits, industrial crops, tuber and root crops, grain sorghum, and entomology; and the diversified programs encompass tropical soils, cheese making, and control of the Mediterranean fly *(Ceratitis capitata)*.

In July 1985, to facilitate monitoring and evaluation actions, the system of follow-up information on the experiments of the national plan for agricultural research was put into effect. Its purpose was to furnish rapid and up-to-date information (programed for computer analysis) on the progress of the experiments and the problems affecting them. The system of follow-up information on the experiments is an improvement over the former system because it streamlines the collection and analysis of the information. In general terms, it consists of a follow-up questionnaire that is filled out on the basis of the information provided by the researcher who is responsible for the experiment and the table of corresponding codes.

Internal Evaluations

Annual Report for 1984

INIPA's annual report for 1984 entitled "Actions and Achievements of the National Institute for Agricultural Research and Extension," published in 1985, synthesizes a number of different internal evaluation studies and activities of the institution itself. Although it was not specifically designed to be an evaluation instrument and document, the information effectively converts the annual report into an internal evaluation of the research, extension, and promotional activities performed by the institution from 1980 to 1984. It compares the results obtained from INIPA's national product programs in terms of the total hectares, the total production in metric tonnes, and the average yield (kilograms per hectare) for each of the products of the national programs at the different levels: national, the Centro de Investigación y Promoción Agropecuaria (CIPA), regional, and the geographic area covered by each of the major investment projects in 1984 with those secured in 1980 in terms of the variables and comparing the results for these years with those of the liaison farmers in 1984.

Table 1 presents a comparison of the yields obtained at the national level for the main products

Table 1. Comparison of yields at the national level of the main products of the national programs in 1980 and 1984 and their ratio to the yields of the liaison farmers.

Products	Yields (kg/ha)				
	National			Liaison farmers	
	1980	1984	% change[a]	1984	% of national
Rice	4274	4765	11.49	5687	19.35
Potatoes	7497	8446	12.66	15040	78.07
Starchy corn	979	1266	25.23	1566	27.73
Hard yellow corn	2831	3218	13.70	4414	37.17
Beans *(Phaseolus vulgaris)*	874	839	–4.00	1333	58.88
Broad beans	1220	1250	2.46	1450	16.00
Lima beans	654	1096	67.58	850	–22.44
Soybeans	2605	1274	–51.09	1550	21.66
Wheat	1215	1057	–13.00	1494	41.34
Barley	932	890	–4.51	1226	37.75

Source: INIPA Annual Report, 1984.

[a] Difference between 1984 and 1980 yields.

of the national programs in the years 1980 and 1984 and the ratio of the nationwide yield in 1984 to that of the liaison farmers at that same time. The yields obtained in 1984 for rice, potatoes, starchy corn, hard yellow corn, broad beans, and lima beans were significantly higher than the amounts of those same products in 1980, in the case of beans *(Phaseolus vulgaris)* and barley there was a slightly negative difference, whereas wheat and soybeans dropped heavily between 1980 and 1984, all of which accurately reflected the economic and agrarian policy priorities adopted by the government during the period. In regard to the comparison of the national yields of those commodities in 1984 with those obtained by the liaison farmers, the latter in all cases, except for lima beans, were considerably higher than the national averages for 1984. Inasmuch as the liaison farmers are the direct beneficiaries of the generation of technology and of technological packages, one can get an idea of what the macroeconomic effect would be if the technology produced were to be adopted by all farmers.

Table 2 complements Table 1 and, in addition to providing data on the average yields in 1980 and 1984 for the same products, also gives information on the number of hectares sown and the total yield for each product obtained in 1980 and 1984. The purpose of this table is to give an idea of the impact the generation and transfer of technology may exert on the cultivated area and on the total yield and not merely on aspects of productivity. It is a known fact that technology plays an important part in extending the agricultural frontier by producing germ plasm that is better suited to the new regions and by generating other know-how that will allow for cultivation under rational conditions. The most characteristic cases have been those of rice, starchy corn, hard yellow corn, beans *(P. vulgaris)*, and wheat, which contributed substantially to the increase of almost 180×10^3 cultivated ha in 1984 over the area sown in 1980.

Table 3, which was computed on the basis of the data given in Table 2, presents the geometric rates of annual growth, shown in percentages, of the production, area, and yield of the main products of INIPA's national programs between 1980 and 1984. These geometric rates are a reflection of the formula that states that the geometric rate of annual growth of the cultivated area added to the geometric rate of annual growth of the yield and added to the product of the two is equal to the geometric rate of annual growth of the production. The growth of the cultivated area and the growth of the per hectare yields over the period studied were responsible for the growth in production of rice, starchy corn, hard yellow corn, broad beans, and lima beans. The growth in potato yields helped to offset the reduction of the area sown with this tuber, keeping its production almost stable. Wheat was almost the exact opposite for its production was kept stable because the growth of the area sown with that crop offset the noticeable drop in its yields. The production of barley, and particularly of soybeans, decreased sharply as a result of both a reduction of the area cultivated and of their yields.

Table 4 presesnts the geometric rates of annual growth of production, area, and yield between 1980 and 1984 for the products listed in Table 3 by sponsorship of INIPA's investment projects, also breaking down the information on geometric rates given in Table 3 but according to a different scheme.

Internal Cost–Benefit Study

To date, the study conducted by G. Norton of the Virginia Polytechnical Institute and State University and V. Ganoza under contract with the North

Table 2. Comparison of cultivated areas, total production, and average yields (1980–84).

Crops	Total hectares		Total production (tonnes)		Average yields		Liaison farmers (1984)	
	1980	1984	1980	1984	1980	1984	Number	Average yields
Rice	99456	227080	425102	1082011	4274	4765	4228	5687
Potatoes	196175	171577	1470707	1449126	7497	8446	5996	15040
Starchy corn	156905	183474	153548	224860	979	1226	4186	1566
Hard yellow corn	133375	177329	377612	570760	2831	3218	4177	4414
Beans *(Phaseolus vulgaris)*	45004	57334	39311	48099	874	839	1878	1333
Broad beans	5048	5175	6159	6471	1220	1250	111	1450
Lima beans	2565	2572	1677	2820	654	1096	142	850
Soybeans	2324	379	6055	483	2605	1274	119	1550
Wheat	67271	75870	81729	80191	1215	1057	1985	1[illegible]94
Barley	103515	88717	96514	78989	932	890	1235	1226
Total	811607	989507						

Source: INIPA Annual Report, 1984.

Table 3. Geometric rates of annual growth (%) of production, area, and yield of selected commodities (1980–84).

Commodities	Production	Area	Yield
Rice	26.30	22.92	2.76
Potatoes	–0.37	–3.29	3.02
Starchy corn	10.01	3.99	5.79
Hard yellow corn	10.88	7.38	3.26
Beans *(Phaseolus vulgaris)*	5.17	6.24	–1.02
Broad beans	1.24	0.60	0.61
Lima beans	13.88	0.07	13.78
Soybeans	–46.85	–36.45	–16.37
Wheat	0.47	3.05	–3.42
Barley	–4.89	–3.78	–1.15

Source: Table 2.

Carolina State University and INIPA during the first half of 1985 constitutes the most complete and systematic evaluation of the costs and benefits of agricultural research and extension in Peru. It was carried out as one of the components of the AID-financed project, "Evaluation of Agricultural Research and Extension in Peru." In particular, the study makes an evaluation of the net economic benefits of INIPA's national programs of agricultural research and extension for five commodities: rice, corn, wheat, potatoes, and beans *(P. vulgaris)*. The study estimates the rates of return on the agricultural research and extension for the products as well as the consequences of distributing the benefits among consumers and producers with different levels of income, size of production units, and regional locations. Norton and Ganoza's study seeks to evaluate the efforts made by INIPA as of 1981 in its main national programs.

The methodological instruments used made it possible to compute the changes in the consumer's surplus, the producer's surplus, and the total net economic surplus. A calculation was also made of the present value of the benefits and of the internal rates of return on the research and extension in the cases of corn, rice, wheat, potatoes, and beans *(P. vulgaris)* and the aggregate of these commodities. The main conclusions reached in Norton and Ganoza's study follow.

Under the most conservative set of assumptions (investment in research from 1981 to 1986 and in extension from 1981 to 1990, considering a pivotal shift in the supply curve), the internal rates of return on the investments in agricultural research and extension were 17% for rice, 10% for corn, 18% for wheat, 22% for potatoes, 14% for beans, and 17% for the aggregate of the five products. Less conservative assumptions (parallel shift in the supply curve), yielded rates of return of 35% for rice, 23% for corn, 28% for wheat, 42% for potatoes, 24% for beans, and 33% for the aggregate of the five commodities. These rates of return are compatible with those found in evaluation studies made in other countries. If this is the case, internal rates of return will be 44% for rice, 31% for corn, 36% for wheat, 42% for potatoes, 24% for beans, and 38% for the aggregate.

In deriving the rates of return, several conservative

Table 4. Geometric rates of annual growth (%) of production, area, and yields from 1980 to 1984 by selected products and sponsorship of INIPA's investment projects.[a]

	IEA/IBRD			REE/AID			PEPSA/IDB			Total		
Crops	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield	Production	Area	Yield
Rice	38.09	35.92	1.59	14.21	13.55	0.58	0.87	-1.95	2.87	26.30	22.92	2.76
Potatoes	8.94	8.19	0.69	1.12	0.89	0.23	-5.67	-9.55	4.29	-0.37	-3.29	3.02
Starchy corn	23.37	7.28	15.01	18.91	12.79	5.42	-2.37	-3.01	0.66	10.01	3.99	5.79
Hard yellow corn	17.49	9.07	7.83	7.49	7.76	-0.25	3.92	-1.71	5.72	10.88	7.38	3.26
Beans (*Phaseolus vulgaris*)	12.56	13.55	-0.88	1.50	-0.55	2.06	0.29	-0.67	0.98	5.17	6.24	-1.02
Broad beans	—	—	—	—	—	—	1.24	0.60	0.61	1.24	0.60	0.61
Lima beans	—	—	—	13.88	0.07	13.78	—	—	—	13.88	0.07	13.78
Soybeans	-46.85	-36.45	-16.37	—	—	—	—	—	—	-46.85	-36.45	-16.37
Wheat	3.76	9.86	-5.54	-0.71	-0.86	0.14	-8.88	-7.10	-1.92	-0.47	3.05	-3.42
Barley	1.19	0.67	0.49	-4.29	-2.79	-1.54	-10.20	-7.53	-2.87	-4.89	-3.78	-1.15
Total	—	13.69	—	—	6.37	—	—	-6.12	—	—	5.07	—

Source: INIPA Annual Report, 1984.

[a] IEA/IBRD = Investigación y Extensión Agricol (Agricultural Research and Extension project)/International Bank for Reconstruction and Development; REE/AID = Research, Extension, and Education/United States Agency for International Development; PEPSA/IDB = Proyecto Especial Programa Sectorial Agropecuario/Inter-American Development Bank; INIPA = Instituto Nacional de Investigación y Promoción Agropecuaria.

assumptions were incorporated into the analysis, even in the case of the highest returns cited in the first conclusion. As a result, these rates of return most likely represent the minimum estimates. For example, no enlargement of the area planted with rice was projected, although it is highly probable that the extension of that area in the jungle region could fully offset any reductions that might possibly occur in the coastal area. Consequently, the rate of return on investments made in research and extension with regard to rice may be underestimated. An alternative analysis made by the study offers another example, assuming that the area planted with rice were to grow 1% a year and that the additional area were to be cultivated entirely following the recommendations of the new technologies, the return on research and extension in the case of rice would be pushed up from 17 to 48%. Furthermore, as originally designed, the study would have attributed all of the costs of the agricultural extension to the national programs even before the new technologies had been launched; however, when this assumption was relaxed while the rest of the assumptions were kept at their most conservative, the returns on investments made in research and extension were much higher.

The internal rates of return on investments in research and extension estimated for the period 1981–85 reveal that these same levels of return (and perhaps a higher level for corn, wheat, and rice) could be obtained if the existing programs of research and extension were to be pursued at the same level as today for a further 5-year period. The rate of return on the aggregate of the five commodities would be 47% higher if the present programs were to be continued, inasmuch as the future research and extension programs could be developed on the basis of the large investments that have been made since 1980. Furthermore, the high returns projected for the initial investments are a result of the transfer and adaptation of the technologies that were generated by the IARCs. The investments made in the national system of research and extension have resulted in the creation of a mechanism that allows for the transfer of those technologies and their adaptation to specific characteristics of Peruvian agriculture.

The adoption of new technologies also means an increased demand for agricultural inputs and credit by the farmers. Furthermore, there will be a heavily enhanced demand for food products, especially if the real per capita income rises more than 1% in the analysis projected for the future. Increases in population and in a real per capita income magnify the importance of the programs of research and extension in their ability to develop and further the adoption of new technologies that augment the production of foodstuffs at prices that are attractive to the consumer. Unless it is able to create and transfer new technologies, the only alternatives that would be left for Peru would be to import foods (at a fairly high cost in foreign exchange) or to bring down the food supply curve. In the latter case, consumers would have to pay a higher price for subsidies to producers and consumers would entail a substantial direct cost for the government and for society in general.

External Evaluations

External Evaluation of the REE Project

Between 7 January and 3 February 1984, an external evaluation was made in Peru of the United States Agency for International Development (AID) project for the development of agricultural research, extension, and education in Peru, also known as the REE project. It had already been planned for among the project's follow-up and evaluation activities. The evaluation team noted that during the first stage of the REE project, that is, between 1980 and 1982, a number of unexpected factors appeared that were not provided for in the descriptive document of the project but had a significant impact on the course of development of the project itself. The main recommendations of a general nature stemming from the external evaluation of the REE project were as follows:

- That the project term be extended to December 1986 and new funds and technical assistance be made available to assist INIPA in arriving at a better coordination of the loans received from AID, the World Bank, and the Inter-American Development Bank (IDB). The additional technical assistance would take the form of the provision of an adviser on human resources and the continued assistance of the consultant on agroeconomics.
- That preliminary planning be immediately initiated for a second stage of the REE national system. In this connection the following was recommended: (a) that a single comprehensive project be prepared among the main institutions involved; (b) that a mechanism be sought for the project's joint management; (c) that a 5-year minimum period be defined for the second stage, lasting from 1987 to 1991; and (d) that provision be made for dividing the work between AID and the World Bank, with the former furnishing technical assistance, training, and some of the operating expenses and the latter providing funds for the formation of the physical capital and procuring the necessary vehicles and equipment.
- That a search be immediately initiated to identify alternative sources for the long-term financing of INIPA's operating costs.

World Bank Evaluation

In January 1985, a supervisory mission from the World Bank visited the country to evaluate the agricultural research and extension project financed by the Bank. Generally speaking, the mission was favourably impressed with the way the five northern CIPAs (Agricultural Research and Extension Centre, one of the 20 centres/divisions of INIPA) had executed the project. It concluded, as well, that the system of training and visits had been fairly well established and implemented in terms of its physical installations, that the operating budgets were quite reasonable, that there was an ongoing technical contact with the farmers, and that the training programs had been suitably organized and were well under way. The supervisory mission also verified that the research programs had already been or were being carried out as initially planned. It was especially pleased by the progress recently made in the national program of Andean agricultural systems and the national agroeconomics program in regard to their research projects at the production unit level. The mission also acknowledged that the five northern CIPAs had done a fairly good job of implementing their physical capital.

ISNAR Institutional Evaluation

In June and July of 1985, at the request of the Directorate of the National Institute for Agricultural Research and Extension, a Mission of the International Service for National Agricultural Research (ISNAR) visited Peru to evaluate the institutional model for research, extension, and promotion in use by INIPA. According to the terms of reference, the purpose of the evaluation was to inform the Peruvian government regarding the model for research, education, and extension that INIPA was using, as well as its effectiveness in tackling the problems of research and extension that restrict agricultural production. Accordingly, the Mission had not only to examine INIPA amd its responsibilities, but also the milieu within which the institution functions. It was quite thorough in its analysis of several aspects such as the country and its agrarian sector, the structure of the research-extension system, the research programs, the human resources, and the international technical cooperation received, and made a comparative analysis of INIPA's institutional model and those used by other Latin American institutions concerned with the production and transfer of technology.

Evaluation of the National REE System

From September to October 1985, Peru was visited by an evaluation mission recommended by the Board for International Food and Agricultural Development (BIFAD), financed under an AID contract and conducted as a follow-up to the basic study of the system of agricultural research, education, and extension. Its main purpose was to evaluate the viability and effectiveness of the national system of agricultural research, education, and extension at the service of Peruvian agriculture and to suggest a long-term strategy (to the end of the century) for the support of the system by the most important international institution involved in its financing.

The recommendations issued by the Mission, aimed primarily at the international institutions supporting the national REE system strongly rooted in the strategy presented, are as follows. First, that INIPA's institutional development should be consolidated by means of larger investments in technical assistance, training, operational support, and physical capital. Second, that the training and research activities of the regional universities should be reinforced and interlinked. Third, that encouragement should be given to a shared involvement by INIPA, the National Agrarian University, and the regional universities in the planning and implementation of the REE programs. Fourth, that the process of technology transfer should be hastened and shored up. Fifth, that INIPA's capacity should be developed in regard to aspects connected with the handling and use of water. Sixth, that the private REE sector should be encouraged to participate in the national REE system.

Utilization of Internal Evaluations

Users

The main "institutional user" of the results of the internal evaluation studies has obviously been INIPA itself. In the first place, the information system for following up or monitoring the research projects has not had enough time yet to yield its most important results or to be duly evaluated with a view to its complete utilization by the institution itself. It is expected that the first concrete results of the follow-up system for research experiments and projects will emerge in 1986. It is also expected that in view of its characteristics of versatility, responsiveness, and effectiveness, the system will provide rapid, timely, and significant information so that the executives and officials of the institution will be able to take immediate remedial steps in regard to any research experiment or project approved for execution. The monitoring system, as a result, becomes an extremely useful instrument for the administration and management of agricultural research, whose basic aim is to secure the greatest possible effectiveness from the resources currently allocated and to maximize the use of and return on the resources to be allocated in the future.

INIPA's annual report for 1984 was prepared with a view to reaching several different publics. From the internal viewpoint there were two objectives. The first was to make everyone working in INIPA, whether at the executive, professional, technical, administrative, or support level, fully aware of what their institution is, of its structure, objectives, programs, and activities, so that everyone might better understand the important role that he or she is called upon to play as an official or worker of the institution. The second was in learning of the important achievements of the institution, of the effectively measured and quantified accomplishments, and of the important contribution that INIPA is already making to Peruvian farmers and agriculture so that each person working in the institution would be made to feel proud of it.

For the evaluation study of the net economic benefits of INIPA's national programs of agricultural research and extension performed by Norton and Ganoza, the target public encompassed the Ministry of Agriculture and its subordinate units; the Ministry of Economy and Finance and, particularly, the General Bureaus of the Public Budget and of Public Credit; the National Planning Institute; the National Development Institute; the Executive branch in general; and the Nation's Congress, especially the Bicameral Budget Committee, the Agricultural Committee, the Economic Committee, and the Permanent Committee of Congress. By reason of its methodological contributions, the study was also intended for use as a training aid at Peruvian universities with departments of agronomy and of economic and social sciences and of other national scientific and technological institutions. At the international level the study was directed to all of the financing institutions and sources (both loans and grants), as well as to training and technical assistance institutions that collaborate with INIPA.

Research Planning and Resource Allocation

During the meetings held to program INIPA's research, the projects under way are reviewed and new projects are presented. These activities, however, are not yet conducted systematically because not all of the current projects are reviewed. In any case, the effort is an attempt to upgrade future planning. When the system for following up and monitoring the research experiments and projects becomes fully operational, then the necessary conditions will be available to allow the following year's (or years') research to be planned on a solid, more permanent basis.

Insofar as resource allocation for research is concerned, this may be broken down into two parts: the allocation of resources to the institution and the allocation of resources within the institution. The results of the various evaluation activities and studies of the research and extension conducted by INIPA to date have been put to use, at least partially, to bring about the allocation of new resources to the institution. Thus, for example, the main comparisons and results set out in INIPA's annual report for 1984 and the internal rates of return estimated in the Norton and Ganoza study for the Institute's national programs were undoubtedly used by INIPA's headquarters for the benefit of the Institution. Armed with those figures, executive officials were able, in July 1985, to secure the approval of the Bicameral Budget Committee and of the Permanent Committee of Congress for two supplementary credits for the investment projects from AID and the World Bank. These totalled close to 90 million intis, which were equivalent at that time to about USD 7.5 million (12 intis = 1 United States dollar).

In connection with the allocation of resources within the Institution, however, there is no knowledge of the results of the different follow-up and evaluation studies, activities, and reports having been used, at least in the degree to which the economic and social returns could theoretically be upgraded. From the theoretical viewpoint, the highest estimated internal return is an indication that the activity that produced it would also be that that would generate the greatest economic and social return. But at the same time, it means that thus far the investments made by society and the institution have been inferior to the economic and social optimum for that activity.

Research Management

Up to now, it cannot be assured that the results of the evaluation reports and studies have contributed to or been fully employed for the management of agricultural research in INIPA. Potentially, conditions exist that favour the use of the evaluation results as an input in the management of the research. This, however, would require the availability of more detailed and processed information that would allow for greater assurance in the making of decisions on the management of human, physical, and financial (and genetic in the case of a research institution) resources insofar as their allocation by program and their regional distribution are concerned. It is evident then that in this case more information and studies are needed. In particular, many hopes have been placed on the system for monitoring and following up research experiments and projects, inasmuch as this could become an extremely useful instrument for upgrading the managerial efficiency of the research.

Utilization of External Evaluation Studies

The most important institutional users of the external evaluation studies are INIPA itself and the institutions that (through loan or grant) finance its investment projects. Up to now, the major part of the recommendations emanating from reports of missions for INIPA's external evaluation have been accepted and implemented. Frequently, those recommendations are implemented in their entirety, which merely goes to show that during their implementation the recommendations are adjusted and adapted to the institution's characteristics and idiosyncracies and to the availability of human, physical, and financial resources and time. In general, therefore, the external evaluation missions that have visited INIPA over the last 2 years have contributed decidedly to strengthening the institution's structure and internal administration and to improving its world image. For the latter, the recommendations stemming from the reports of the missions have also been, because of their neutral and constructive nature, devoid of any obligations and served as a "vote of confidence" in the development of the institution's national projects and programs. But basically they have helped to shore up the institutional model. The conclusions and recommendations of the external evaluation missions have, then, been used by the institution's headquarters and executive personnel to promote and project a better image of the Institution within the national public sector in general and within the agrarian public sector in particular to seek, as a last resort, the political and financial support needed for the institution's strengthening and development.

Recommendations

Installation of the information system should be done as quickly as possible for following up or monitoring agricultural research to verify its efficiency and progressively improve it over time. It is suggested that the information be prepared three times a year, i.e., every 4 months, at the end of February, June, and October of each year.

A new mechanism should be introduced within the overall concept of follow-up and evaluation consisting of the preparation of an annual report (or final report) for each project. The same questionnaire could be used for the presentation of both the annual report and the final report on each project. The annual report would be prepared for projects under way whereas the final report would be used for projects that have concluded or been cancelled. The purpose of the annual report would be to receive and evaluate information on the course of development of the research activities planned in the project from the moment of its initiation to the date on which the report is submitted.

The idea of a "technology bank" should be introduced within the concept of the follow-up and evaluation of agricultural research. This is nothing other than the maintenance of an up-to-date technological inventory that could be useful to and well employed not only by researchers but mainly by extension agents, social and economic scientists, executives and officials of the institution, similar entities of the public or private sector, farmers' associations and individual farmers in general, and so forth. The main purpose of the technology bank then would be to inform those publics and public opinion in general instantaneously of what has been produced in terms of agricultural technology. Internally, and in benefit of the institution itself and of other public or private agricultural research institutions, the system would help to avoid duplications or repetitions by furnishing information on what has been produced, the producing agent, and how, where, and when the technology was created. Furthermore, and this is also important, the bank would also make it possible to know what agricultural technology has not yet accomplished in terms of each product, national program, region, and so forth. This system would have to be computer oriented, so an ad-hoc questionnaire would have to be available for collecting the data. The periodicity would have to be yearly insofar as the collection and publication of this information is concerned.

It is also recommended to continue furnishing the necessary support for the normal development of the Project on the Socioeconomic Evaluation of Research and Extension in Peru of the National Agroeconomics Program financed by AID. The necessary institutional support should come both from INIPA and AID and its continuity should depend on the approval and financing by AID of the second stage of the research project, agricultural education and extension, planned for 1987–91.

This effort should be pursued to complete the analysis of the linear programming that was undertaken to look into the influence of the new technologies on possible crop mixes, variations in income, and the demand for credit, labour, water, and other resources, as well as the effect of policies on input and product prices in the adoption of new technologies. Another element of the project is the estimation of response functions for individual crops using experimental data, with a view to examining the responses in terms of production to different input levels, either with or without the use of new technologies.

Every possible effort should be made to secure seasonal data on agricultural production and on inputs in Peru to further the study of an aggregate production function or the analysis of a profit function to examine the relative contribution made by agricultural research extension and education to agricultural yields in Peru. This project would also assess the influence exerted by agricultural research, extension, and education on the demand for inputs and the returns to scale. Accordingly, for example, this study could verify the impact of the research, extension, and education not only on the product supply but also on the demand for labour, machinery, fertilizers, energy, and other inputs. The study could also make comparisons between the contributions of the prices of products and of inputs (and of other fixed factors such as the size of the production unit, the intensity of irrigation, the capitalization of the production unit, and agricultural credit) to the variables cited earlier.

Finally, the necessary calculations could be made for the performance of an analysis of the congruence and of the surplus of both the producer and the consumer. This could be used to formulate recommendations to help INIPA in making decisions on the current and future allocation of resources to research and extension. In this way, the Project on the Socioeconomic Evaluation of Agricultural Research and Extension would produce a very high technical, economic, and political pay-off because its results would doubtlessly help to augment the financial resources for the institution and enhance their timeliness and upgrade the mechanisms for allocation of funds to the institution and for the allocation of resources to research and extension within the institution itself.

It is highly advisable to improve the institutional coordination between INIPA and the Agrarian Bank of Peru, to which end the agreement that exists between the two institutions should be fully operational. In the specific case of the evaluation of the results of the research, coordination would take the form of installing the software in the Bank's microcomputers that INIPA's National Agroeconomic Program possesses to make an ex ante analysis and evaluation of the new technologies. I am specifically referring to installing the software already developed by INIPA in the branches, agencies, and offices of the Agrarian Bank of Peru in whose use the Bank's technicians and experts would, naturally, be duly trained. In this way, the farmer who requests a loan could get an idea of the return that might be expected and the risks involved, such aspects being tied in with the adoption of new technologies. The Bank will also, of course, be interested in knowing a priori the probability of recovering the loan being requested. This enhanced coordination with the Agrarian Bank of Peru would allow for excellent feedback for INIPA's agricultural research programs and projects.

External Evaluation Missions

It is recommended to include a high-level executive of INIPA or of the Ministry of Agriculture, preferably with the status of executive director, among the team members of the missions for external evaluation. This would make it possible to achieve several objectives, the most important of which are (a) the mission would have among its members a person to be trusted in his or her thorough knowledge of the institution and of its problems and who could be consulted at any time by the other team members as a national counterpart; (b) the national institution would be committed to the aims, methodology, findings, and recommendations of the mission for external evaluation; and (c) the consequence of the first two objectives would be that INIPA would be more willing to adopt the recommendations of the mission. Up until now, most of the recommendations made by the missions for external evaluation have been aimed more at the financial institutions and organizations for external technical assistance than at the national institution itself. But even in the case of the recommendations intended directly for the national institution, its executives and professionals have had the feeling that the team issuing them did not necessarily have the necessary internal political support. The inclusion of a high-level executive of the institution among the members of the mission for external evaluation could help to solve this problem.

It is also recommended, in connection with the foregoing, that the evaluation mission secure better "political preparation" before its trip. In this regard, the financial institutions and organizations for technical assistance, as well as INIPA itself, should launch, a priori, a campaign among the high-level echelons of the Ministry of Agriculture and the Ministry of Economics and Finance to publicize the importance of the evaluation mission, the capacity of its members, and the significance of its findings and recommendations to the farmers, the consumers, the agrarian sector in general and the national agricultural economy in particular. In other words, it is a question of obtaining firm political support for the mission even before the visit is made, and, ideally, having that support be given an official stamp of approval through a Ministerial Resolution or, better yet, a Supreme Resolution.

Official approval should be secured, a posteriori, of the main findings and recommendations from the report of the mission for external evaluation, which affects the national institution. This official sanction should be secured in the form of headquarters resolutions or ministerial resolutions or both, as the case may be, so that the mission's recommendations might be given formal and legal approval and have the necessary institutional and political support for furthering their rapid implementation.

Among the members of the mission team for the external evaluation at least one Latin American expert should be included from a similar institution for agricultural research or extension in Latin America or from the Inter-American Institute for Agricultural Cooperation. Often the problems encountered by Latin American countries in regard to agricultural research and extension bear more similarity than those of a Latin American country to the problems of the U.S. or of a European country in that area. As a result, the solution found by a Latin American country to a given problem may be more viable and rapidly implementable in the country that is being visited by an evaluation mission.

The missions for external evaluation should take up the recommendations made by Norton in 1985 in regard to the guidelines, content, procedures, and most salient aspects of the organization of the research, which should be taken into consideration by any mission for the external evaluation of a national research system. As regards the content and procedure, Norton suggests that any examination of a national system of agricultural research should encompass the criteria on which to base the evaluation of the components of the agricultural research programs; analysis of the institution's aims, targets, and priorities; analysis of the institution's organization and of its capacity to direct and carry out programs of agricultural research; and aspects of the institution's administration connected with its planning, implementation and monitoring.

There should also be an analysis of all of the institution's relations, both horizontal and vertical; in-depth analysis of the number and quality of the existing research programs; insofar as possible, a qualitative evaluation of the impact exerted by the research programs on yields, the distribution of benefits, employment, nutrition, and so forth. An evaluation of the institution's existing and future needs should be done in regard to the number and coverage of its research programs, their organization, facilities for management, training, financing, and so forth.

Finally, Norton recommended, for the success of the mission, that the following elements be included. (a) the relationship between the national research system and the IARCs; (b) priority with which or the extent to which the national research systems should adopt the methods of research on production systems; and (c) the need to have a theory that would provide orientation on the way in which the national research systems should operate. This last point would acknowledge the existing differences among countries as to history, culture, climate, topography, education, and size. The political and economic differences would also be considered as would the long-term nature of the agricultural research programs.

Evaluation in the Caribbean Agricultural Research and Development Institute

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The Caribbean Agricultural Research and Development Institute (CARDI), founded in 1975, is the main regional research and development (R&D) institution of the CARICOM countries with a mission to contribute to agricultural development through the generation and dissemination of appropriate technology for the benefit of the Caribbean people. The Institute's mandate is (a) to work in a mode of optimum decentralization, (b) to seek external funding, and (c) to increase the productivity of the agricultural sector. The agricultural sector is still the major area offering the best potential for providing better nutrition, increased incomes, and adequate employment opportunities. Agricultural research in the region has had a long and distinguished history from the days of the Imperial College of Tropical Agriculture (ICTA) started in 1921 (now the site of the St Augustine Campus of the University of the West Indies [UWI]) followed by the Regional Research Centre (RRC) added to ICTA in 1955, which merged with the Faculty of Agriculture of UWI in 1965–66 and, in 1975, became CARDI, the new autonomous regional R&D organization.

In the last 10 years, CARDI attracted substantial external funding to support its decentralization to 12 locations and its R&D programs. The major donors were the European community through the European Development Fund (EDF) and the United States Agency for International Development (USAID). A series of evaluations was undertaken with varying foci: major project evaluations for the EDF and USAID projects, full evaluation of the entire Institute (heads of government review committee), program review of the Institute by the International Service for National Agricultural Research (ISNAR), and specific evaluations in organization and management, including financial and data collection. The evaluations led to major changes in the Institute by its management. The Institute has set up its own Programing, Planning, Monitoring and Evaluation unit (PPE). Other major changes in organizational structure, policy, programs, financing, etc., are expected to be included soon. The evaluations have been commissioned at various levels including the highest — the Conference of the Heads of Government. As a result, they are being used by the heads of governments, ministers of agriculture, technical personnel in the ministries of agriculture, the Institute, and funding agencies.

The agriculture sector continues to be the mainstay of the economies of the majority of the Caribbean countries that are members of the Caribbean Agricultural Research and Development Institute (CARDI). The 12 Caribbean Community (CARICOM) member countries combined include a population of about 5 million of which 4.5 million are in the five larger territories and 0.5 million are in the seven smaller islands. About two-thirds of the population is rural. With the exception of Trinidad & Tobago and Barbados, the gross domestic product (GDP) per capita averages around USD 1000 (USD = United States dollar). Some 2.2×10^6 ha in the region is in farms (numbering 300000) of which 0.6×10^6 ha is cropland. About 90% of all farms are under 4 ha, but they account for only one-quarter of the land area.

The importance of agriculture in the economy of the region can be described in terms of contribution to GDP, employment, and trade. With respect to the share of agriculture in GDP, there are wide variations within the region, ranging from a high of 30.2% in Dominica to a low of 2.7% in Trinidad. The countries may be divided into three groups:

- GDP of agriculture less than 10%: Antigua, Barbados, Jamaica, Montserrat, and Trinidad & Tobago;
- GDP of agriculture between 10 and 20%: Belize, Grenada, St Kitts-Nevis, St Lucia, and St Vincent;
- GDP of agriculture greater than 20%: Dominica and Guyana.

The relative contribution of agriculture has remained stable since 1979, and the countries have remained within the three groups with the exception of Grenada, which has shifted from a higher share of agriculture to the middle group. In spite of the relative importance of agriculture in the CARICOM region, the performance of agricultural production is poor, and much of it is in a state of chronic decline. The worst trends are for the traditional export crops; since 1965, sugar exports have declined by 60% and banana exports by 50%. Not only is production for export chronically depressed, but food production is insufficient to keep up with population growth.

Research Institutions

The research work of CARDI is clearly predominant regionally. It is, however, necessary to place

CARDI within the context of research conducted and sponsored by other organizations throughout the CARICOM countries. Although in recent years the international centres, especially the International Centre for Tropical Agriculture (CIAT), the International Centre for Maize and Wheat Improvement (CIMMYT), and the International Potato Centre (CIP) have become increasingly active in the Caribbean Basin, the multinational approach and networking in agricultural research is still in its infancy.

CARDI plays an important role in the Leeward and Windward Islands and in Belize. It plays specific but lesser roles in the larger areas, a very limited role in overall region-wide research servicing, exchanges of materials, and information, but relatively little in regional research coordination. Besides CARDI, there are only three institutions that have a truly regional scope: the West Indian Cane Breeding Station (WICBS) located in Barbados, the Windward Islands Banana Growers Association (WINBAN) in St Lucia, and the University of the West Indies Faculty of Agriculture (UWI) within the education sector at St Augustine in Trinidad.

WICBS

The Cane Breeding Station, financed by the Sugar Association of the Caribbean, is a small, high-quality centre. Its clientele goes much beyond the anglophone Caribbean. It concentrates on crossing, variety selection, and quarantine, and maintains a large germplasm collection and regional data to help formulate breeding plans. The staff fluctuates from two to five scientists and an equal number of technical assistants, a field manager, secretary, and 12–16 fieldworkers. WICBS shows what a highly focused and in-depth research network can do on a very modest budget. One of the keys to its success is client financing for services rendered of economic value.

WINBAN

WINBAN, which has commercial, marketing, and financial functions in the banana industry, operates a well-respected research and development (R&D) program. The program is comprehensive in that it includes soil and leaf analysis (through a chemistry laboratory that also serves other clients); fertilizer and herbicide testing; leaf spot, nematode, and borer control; and a cropping systems project. WINBAN also engages in fruit quality research and serves as a communication centre for its clients as well as other regional and international institutions. WINBAN is a founding member of the Association for Collaboration in Banana Research in the Caribbean and Tropical America (ACORBAT). ACORBAT has been interested in affiliating in some way with an existing international organization. The WINBAN staff consists of 11 scientists (6 PhDs and 5 MScs) and 10 BSc graduates. There is a supporting staff of 16, half of whom have diplomas. The annual budget is around ECD 4 million (2.70 Eastern Caribbean dollar [ECD] = 1 United States dollar).

Faculty of Agriculture (UWI)

The Faculty of Agriculture of UWI is mainly a teaching institution, but it does engage in research as well. The faculty has more than 40 staff members, mostly at the PhD level. Six positions are in agricultural economics, 16 in biological sciences, 6 in crop sciences, 4 in livestock sciences, 8 in soils, and 3 in extension. There are 9 formal research programs, most of them on a modest scale. The most important one is in grain legumes, which concentrates on pigeon peas.

Regionally, the most significant research at UWI is centred in the Cocoa Research Unit (CORU), which operates in close relationship with the Ministry of Agriculture's Cocoa Research Department. CORU has four professional staff, with one occasionally located in Jamaica. External funding is from the Cocoa, Chocolate and Confectionary Alliance (CCCA) of the United Kingdom and from the European Development Fund (EDF). The EDF project was designed specifically to consolidate the germ-plasm collection into a single site at a new field station. CORU resources, however, for laboratory and field facilities (not to mention outreach) are considered minimal.

In recent years there has been a heavy influx into CARICOM countries of technical assistance personnel (and some associated funding for equipment) from regional and international agencies, as well as from bilateral donors who provide human resources for research-related activities generally on a short- to medium-term basis. The most valuable portion of such assistance is in the form of resident advisers with multiyear contracts, but there are many more short-term technical assistance specialists. To the extent that the number of well-trained Caribbeans grows, expatriate help is less needed. CARDI has been particularly successful in employing, retraining, and distributing Caribbean scientists within the region. It is, therefore, somewhat ironic that CARDI now has to compete with extraregional organizations for technical assistance funds.

Finally, the National Agricultural Research Systems (NARS) are a combination of public and governmental bodies, generally parts of ministries of agriculture, some quasi-governmental or parastatal organizations, and privately sponsored, generally commodity-specific institutions.

CARDI

During the British colonial period in the Caribbean, a Regional Research Centre (RRC) was established in 1955 on the campus of the then Imperial College of Tropical Agriculture (ICTA) to undertake research on problems of interest to the Caribbean region and to provide a nucleus of specialists on call to teach or give advice in their area of expertise in addition to working on their research programs. Following independence and the establishment of the West Indies Federation in 1960, the former ICTA merged with the University College of the West Indies (UCWI) and became the Faculty of Agriculture of the UWI. In the late 1960s, with withdrawal of British funding in view, RRC assets were vested in the University, staff were transferred to the Faculty, and, to all intents and purposes, RRC was integrated into UWI. Following the announcement that the United Kingdom government funding would be phased out during 1971–75, the then independent states of the anglophone Caribbean (CARICOM) met and decided, on the basis of the Campbell Mission Report, to develop and maintain a regional research body in agriculture, and CARDI was established in late 1975.

CARDI is an autonomous institute established by the governments of the Caribbean Community (CARICOM). It was created in 1975 as a regional organization for agricultural R&D within the framework of Caribbean regional economic integration. The countries involved in CARDI are Antigua, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Montserrat, St Kitts-Nevis, St Lucia, St Vincent, and Trinidad & Tobago.

In the 1975 agreement establishing CARDI, the objectives were to

(a) Provide for the R&D needs of the region as identified in national plans and policies;

(b) Provide an appropriate R&D service to the agricultural sector of member countries;

(c) Provide and extend the application of new technologies in production, processing, storage, and distribution of agricultural products of member countries;

(d) Pursue, for specified periods, long-term research in pertinent areas;

(e) Provide for the coordination and integration of the R&D efforts of member countries where possible and desirable;

(f) Undertake teaching functions normally at the postgraduate level, limited to the development of the relevant research by any member country; and

(g) Seek the optimum decentralization of facilities.

To achieve these objectives, CARDI develops a work program in concert with the governments of the member countries and national and regional organizations. The work program is reviewed and revised on a continuing basis as needs and priorities change, as projects are completed, and as new funds become available. The Institute participates in project identification and planning and becomes the implementing agency.

Work Program Development

The work program consists of many projects, generally grouped within certain major programs. Projects develop in several ways:

- Those undertaken at the specific request of a regional or national organization of the government, sometimes in a new area.
- Those undertaken as technical assistance to a regional or national project and intended to solve specific problems or provide ongoing monitoring and technical advice to management;
- Those supportive of major CARDI programs and aimed at furnishing specific information necessary for that program; and
- Those identified by national and regional bodies.

All projects are developed on a collaborative basis with ministries of agriculture or other national agencies or both, such as commodity associations or statutory boards. They reflect national priorities and form integral parts of national programs. As far as local resources allow, technical staff of ministries and other organizations collaborate on projects. Ministries and other organizations or individual farmers usually support projects by providing land, equipment, and other facilities as appropriate. CARDI allocates its resources staff to provide specialist services and to augment country staff.

In summary, the process of development of the work program from the initial project request to its implementation takes into consideration the priorities of the country and region and the resources available to the Institute in the form of manpower, finance, and other facilities. External funding is requested where possible to support the work program activities that otherwise may not be possible or be undertaken in only a few countries or areas.

Mission Statement

CARDI's mission is to contribute to agricultural development through the generation and dissemination of appropriate technology for the benefit of the Caribbean people. The Institute seeks to execute its mission principally by developing and demonstrating appropriate technology for increasing production, productivity, and utilization of food commodities for domestic and export markets through the following mechanisms:

- Development and implementation of R&D programs that respond to the needs of Caribbean member states at both the national and regional levels;

- Development of a work program taking into account national and regional priorities, resources and capabilities of the Institute, work being done by other institutions, and the availability of funding from member states and other sources;
- Collaboration with and establishment of mutual support systems with national and regional institutions concerned with production and marketing and support services to agriculture;
- Establishment and maintenance of contracts with international agencies active in areas beneficial to the work of the Institute;
- Pursuit of appropriate funding from international sources in support of program areas;
- Development of a system for information transfer so that the outputs of its R&D activities are channelled to appropriate agencies and to farmers;
- Provide for ongoing review of its performance, thrust, and priorities; and
- Strengthen and develop the Institute's capabilities in agricultural R&D.

Research Policy

The adoption of the Regional Food and Nutrition Strategy (RFNS) by CARICOM heads of government at the Fourth Conference of Heads of Governments in July 1983 has meant that the policy of regional organizations should be based on the philosophy and objectives of the RFNS. This ensures not only relevance but also coordination of activities among the regional organizations and between them and the national executing agencies. It follows, therefore, that the policy of CARDI as a regional research and development institute must be rooted in concepts and goals of the RFNS. The objectives of the RFNS of direct relevance to CARDI can be summarized as follows:

- Increased production in the food sector;
- Increased proportion of domestic foods in total food consumption (increased production, distribution, and utilization);
- The conservation and generation of foreign exchange (increased domestic production, reduced imports, and increased exports);
- The reduction in the food import/export ratio;
- Increased proportion of energy and protein intake from domestic sources (increased root, pulses, and legume production); and
- Increased food reserves (through reduced losses).

It is clear that, while not ignoring the foreign exchange earning consideration, the primary focus for the agricultural sector over, for example, the next 5–10 years is in the production of food for the regional market and increases in regional food security. This comes against a background of a food import bill of about USD 1 billion/year. Certain factors, therefore, become important in the development of CARDI's research program:

- An assessment of requirements of the regional market, as well as Third World market opportunities;
- Given small or stagnant increases in growth rates projected for the regional economy over the next 5 years, food consumption patterns are likely to be relatively stable. This means that if domestic food production is to be increased significantly, it will have to be done at the expense of food imports; and
- Some member states are putting national food plans in place, but all member states will soon agree on the institution of a Common Protective Policy (CPP) to facilitate protection of the regional market from Third World imports.

Given CARDI's mission, its original objectives and those of the RFNS, and the development taking place within the region, a basis has been provided for formulating a research policy that is responsive to the needs of member governments. This broad statement of intent is reflected in the Institute's far-ranging programs, which encompass food legumes and cereals, root crops, vegetables, tree crops, cotton and animal production, and additional programs in soil and water management, integrated pest management, and engineering.

The focus of CARDI's strategy is in the second clause of its mandate that calls on CARDI to provide an appropriate R&D service to the agricultural sector of member states. The question of what is appropriate at any given moment in the agricultural development of the region and, more particularly of the member states of that region, is a sharpening of focus by periodic definition of appropriate roles for CARDI from time to time by its governors.

CARDI, therefore, works in the agricultural environment just described, limited only by its objectives and resources. It has some 75 professional staff and about 120 support staff and a total annual budget of about USD 7 million, half of which comes from various donor agencies. Jamaica and Trinidad & Tobago each contribute one-third of the "core" budget, Barbados and Guyana, one-ninth each, and the remaining one-ninth is shared by the eight remaining member states.

CARDI member countries, even though they are all English speaking, have diverse agroeconomic zones and are dispersed over a wide geographic area in an arc from Belize to Guyana — about 3200 km. Six currencies are used, and the cultural backgrounds of the people are highly variable. Even though there is an increasing common policy in agriculture, there are great differences in strategy and resource allocation for meeting national and regional goals and objectives. A mix of the foregoing provides immense challenges and makes managing CARDI a unique but difficult proposition.

Evaluations

Institutional Evaluation

A series of evaluations of the Institute were commissioned. The first was a management audit commissioned by the governing body (ministers of agriculture). This was conducted by a Caribbean-based organization, Agrocon Ltd, external but under contract to CARDI, and financed by core funds from CARDI. The approach used was a mixture of limited interviews and review of secondary information (reports, etc.). The second involved an evaluation of the organization and management systems of the Institute by the Caribbean-based Systems Ltd to review existing system and audit reports, conduct staff interviews, develop appropriate systems, and prepare manuals for implementation of the systems. This evaluation was a follow-up on a recommendation of the management audit by Agrocon Ltd. It also arose out of a recommendation made by the project evaluation team of the USAID-funded cropping systems project 538-0015 that in a follow-up of Phase II USAID should fund major institutional strengthening activities. This Systems Ltd evaluation, although commissioned by the governing body, was, however, funded from the Phase II Farming Systems Research and Development project (FSRD) 538-0099.

As part of the follow-up of the Agrocon Ltd study, the governing body also commissioned a review of the existing financial and accounting system of the Institute and the development of improved systems with manuals and provision of appropriate training in the use of the system. This evaluation was conducted by the Caribbean office of Price and Waterhouse and funded from FSRD project 538-0099. It is noteworthy that based on the recommendation of the management consultant to the Institution through FSRD project 538-0099, CARDI developed an inhouse task force that worked with Systems Ltd during its evaluation.

Also, based on the recommendation of this consultant, CARDI began the development of an inhouse strategic planning capability and the first strategic planning workshop was an internal evaluation of the Institute — its objectives, mission, research, and other policies, and research programs, projects, and human resources (financial and physical). This now forms an internal institutional evaluation that will take place once every 2–3 years.

Finally, complete and comprehensive evaluation of all aspects of the Institute, its organization, work, impact of the work, financing, management, links, and resources, was commissioned by the heads of government on the recommendation of the Institute governing body under the chairmanship of C. Sorhaindo, Vice-President of the Caribbean Development Bank (CDB). It was facilitated and financed by the CARICOM Community Secretariat (CCS).

Project and Program Evaluation

The two major sets of programs are funded by USAID and EDF. These include field-station facilities in St Kitts-Nevis, Cropping Systems Research (CRS) project 538-0015 and FRSD 538-0099, mainly in the eastern Caribbean (1983–88), but with a major effort in overall strengthening of the Institute, and a total of about USD 10 million over the period 1976–88 funded by USAID. Funding is also provided for equipment, vehicles, field-station buildings, laboratories, and assistance to CARDI in yam investigations, forage legumes, aroids and arrowroot investigations, soil and water management, and back-up research to CARICOM farms in Belize. This totals about USD 6 million over the period 1979–88 and is funded by the EDF.

For the USAID-funded CRS project 538-0015, a major evaluation was conducted at the end of the project. The evaluation of the EDF project was also conducted during the middle of Phase II for both Phase I and Phase II. A mid-term external evaluation is currently being done for the FSRD project 538-0099.

FSRD Project 538-0015 (CRS)

The key FSRD project objective was the development of at least 12 improved cropping systems among farmers through adaptive research aimed at improving the economic viability of small-scale farming. The major outputs will be the establishment of eight country teams trained in farming-systems philosophy and methodology, a study of the agrosocioeconomic characteristic of the farmers, identification of constraints, application or generation of technology or both to remove these constraints, testing and validating these so that 12 improved systems (increased income, greater nutrition, and employment generation) will be developed and adopted. The terms of reference and the findings of the evaluation team follow.

Terms of Reference

Objective

- To evaluate the effectiveness of the Small Farm Multiple Cropping Systems Research Project (SFMCP) in improving the income and well-being of small farmers by development of appropriate management and production technologies. This will involve examining the (a) acceptability of proposed interventions by experimental groups and the potential of these interventions for wider application; (b) methodology and the results of small-farm surveys and analyses; and (c) net benefits to small farmers of project interventions.

- To evaluate the appropriateness of the project as a basic model for applied research in small-farm agriculture in the eastern Caribbean, including the institutional framework at both the regional and the national levels.
- Provide specific recommendations concerning further assistance in the area of applied agricultural research, particularly as it related to improving the income and livelihood of the small-scale farmer in the eastern Caribbean.

Scope

- To achieve the first objective, the evaluation team will: (a) assess the effectiveness of CARDI's efforts to date, collect and interpret the data, and determine appropriate interventions for project target groups; (b) examine interventions under way and recommend improvements, if needed, or changes in agronomic approach; and (c) analyze the ability, to date, of CARDI to transmit information on improved technologies to extension personnel, farm groups, and other clientele.
- To achieve the second objective, the evaluation team will undertake the following. The team will examine the ability of CARDI to coordinate and adapt its institutional structure to perform appropriate small-farm adaptive research, particularly as it relates to the CARDI multidisciplinary approach. It will also examine the institutional absorptive capability of public and private agricultural organizations in the smaller islands of the eastern Caribbean to utilize existing applied research. The team will examine the priority needs of various islands relating to applied agricultural research and discuss the effectiveness of the project in addressing these needs.
- To achieve the third objective, the evaluation team will (a) make recommendations for appropriate areas of applied research, both regional and country specific, for USAID involvement in the future and (b) recommend appropriate institutional arrangements and procedures for such applied agricultural research activities and programs.

Infrastructure for Applied Research and Extension

The SFMCP was established to develop recommendations for improved farming systems through adaptive, farm-based research. Although the ambitious objectives of the project were not fulfilled, and many of the expected results were not obtained, a sound infrastructure for applied research and extension at the farm level has emerged.

Certainly, the designers expected some sort of applied research support to develop at the farm level. What was not expected was that FSR would be so readily embraced by the farmers and become the focal point for ministry programs. In every territory visited, it was obvious in conversations with the ministers of agriculture, the permanent first secretary of agriculture, and the chief agricultural officers that they considered the CARDI research program and the FSR program as their program. In several cases, this is the first tangible ministry research effort in their country and they plan to support it.

The infrastuture for applied research and extension evolved with the successful establishment of country/CARDI teams on farming systems research. These teams assess the farmers' current practices, identify problems at the farmers' level of operation, and then conduct on-farm, problem-solving, adaptive research. During the survey (questionnaire) process, the country team discovered the complexity of the existing farming system and became involved in helping the farmer, i.e., target group. The evaluation team was impressed with the rapport that has developed between the country team members, Ministry of Agriculture staff, and the farmers. We have seldom seen an infrastructure for development in place in such a short time after the initiation of a research organization.

Implementation Problems and Assets

In the view of the evaluation team, the most serious implementation problems include the following:

- The project, as designed, was far too ambitious.
- The "state of the art" of farming systems is still in its infancy with most projects targeting on relatively simple monoculture systems — agriculture in the eastern Caribbean is very complex. Also, most of the farmers are part time.
- The project, from its inception, needed a fulltime, outside technical adviser who was knowledgable about FSR, questionnaires, data analysis, and interdisciplinary and on-farm research.
- Poor interterritorial communications seriously inhibit project planning and implementation.
- Early and systematic evaluation of the SFMCP by USAID, although specified in the project paper, never occurred. The team found no evidence of quarterly reports, the usual method of tracing a project's progress.
- The data collection process has been allowed to dictate project objectives and manpower deployment, not vice-versa.
- The project, partly exacerbated by the early decision to begin working in eight territories, has spread itself too thin and has tried to capture far

too much detail about a subsample of farmers that represents neither a homogeneous group within a country nor a random sample of the country's farmers.

· Ad hoc exploratory interventions do not necessarily represent constraints identified in the informal or formal data analysis process, nor have they been systematically replicated enough to represent either within-farm or intrazonal variability.

· Too much up-front emphasis on data collection and detailed analysis, coupled with a lack of implementation flexibility, led to a cautious, slow approach to field trials (interventions). This is a rather inefficient attempt at implementation to date.

· Failure to attain a true interdisciplinary interaction of CARDI core personnel has led to minimal benefits from the potential interaction of the several disciplines involved in the research project.

Despite these problems, there were positive aspects of the project. A sound infrastructure for applied research and extension has emerged at the farm level. CARDI/FSR project members and consultants became aware of the complex farming systems of the region. A number of production constraints were discovered, and on-farm adaptive problem-solving research was initiated. The project also discovered several weaknesses in CARDI that must be strengthened.

The major recommendations held that Phase II of the SFMCP should address the strengthening of research performance. The new project should be research oriented and build on the institutional capability created in CARDI during the SFMCP project (also called farming systems research). It should focus on on-farm research; strengthening CARDI's research capabilities by improving research management, strengthening professional research staff, increasing technical support staff, providing for staff training, and increasing agricultural research funding. It should also include research on production/marketing linkages and develop and strengthen a new research/extension interface.

Other supporting recommendations are as follows:

· A farming systems agricultural economist or agronomist with hands-on experience in conducting farm trials should be assigned to the project full time to work as a technical counterpart to the project director for a period of not less than 2 years.

· An economist should be assigned to each of the Windward and Leeward Island groups.

· Each country team should be provided with transportation and the basic equipment and supplies for research.

· The review team recommends the establishment of a technical management group to assist the director of research and development in the overall management of the technical personnel and resources of CARDI.

· For budgeting and operational reasons, the positions of director of administration and director of finance should be combined into one position, the director of administration and finance.

· That a system of overhead fees for basic core staff support be identified and budgeted for each externally funded project. Such funds would be for direct support in areas of basic research relevant to the new project and might also be used to establish a contingency fund for staff salaries when cash-flow problems develop.

· A precise job description should be developed for each staff member of CARDI that clearly states the area of endeavour, accountability, and methods of evaluation. The staff members' performance should be reviewed annually by resource people or administrators in the management group who are affected in some way by the resource staff's activities.

· Long-term funding should be established in Phase II to provide support for both graduate-student research and UWI staff travel for activities compatible with the CARDI/FSR project. Such activities can include technical research and extension.

· To provide a broad-based communication between country FSR projects and the extension area, the team recommends that an FSR coordinating group be formed that would meet regularly and rotate among the country projects. This group would consist of the country team leader, the two regional technical coordinators, an extension adviser from UWI, and the project leader. It would be advisory in nature to the project director but could form an important link between UWI extension and development of the extension phase of this FSR work.

· An effective system of radio or telecommunications should be developed to link CARDI units.

· Further development of the CARDI regional research stations in St Kitts-Nevis and St Lucia.

· Funding of research programs in: soil and water management systems, simple field implements and power source systems, cropping systems and management, forage crop and livestock systems, production of drought grasses and legume species for dry leaf meal production, and studies on solar drying and leaf meal production for livestock supplement.

· Two pest-control specialists should be assigned to the eastern Caribbean region, one each to the Windward and Leeward Island groups. In the future, each territory should have a pest-control specialist.

· The CARDI core staff should be strengthened in the disciplines of entomology, plant pathology, agricultural engineering (hydraulics and small-farm mechanization) and in agricultural economics, i.e., marketing, plant breeding or crop improvement, and postharvest physiology.

The study by ISNAR was essentially an evaluation of the programs of the Institute. It was agreed, however, that on the basis of its review, ISNAR would direct its report and recommendations to the Board of Directors of CARDI with its views on the need for changes in, or reorientation of, the objectives, program or program elements of the Institute, on possible improvements to its efficiency, and on means of overcoming identified constraints to its efficient operation. The observations and recommendations that are made by ISNAR will be reviewed by the Board of Directors of CARDI and the Standing Committee of Ministers responsible for agriculture, but will in no way commit either CARDI or ISNAR to particular actions.

The general terms of reference of the Heads of Government review committee are

(a) To consider how agricultural R&D needs can be met with minimum duplication of efforts.

(b) To evaluate the efficiency and effectiveness of the R&D and delivery systems.

(c) To study and make recommendations on the work, impact, and funding of CARDI.

Issue Evaluation

CARDI, within its CRS project 538-0015, commissioned an evaluation of one component — data collection and analysis with external assistance. The Institute, therefore, has internally evaluated components of its International Development Research Centre (IDRC) funded milk production project in Guyana using workshops.

In this paper, some terms of reference and recommendations have been presented to illustrate the different foci of the evaluation. The various categories of evaluations conducted have also been described. It should be noted that the studies were also commissioned at various levels ranging from the (a) Heads of Government, Sorhaindo Committee; (b) the Governing Body, Agrocon Ltd study, Price and Waterhouse study, and Systems Ltd study; (c) Board of Directors, ISNAR study; (d) project/programs (externally funded by USAID, EDF, and IDRC); and (e) the Institute management/workshops and issue of data collection and analysis.

Uses and Benefits of Evaluations

The links between the various evaluations and recommendations has been outlined in Fig. 1. The recommendations of the ISNAR review have now been received; however, because they came at the same time as those of the Sorhaindo Committee, their input will be part of the Governing Body decisions for the Institute. Consideration in this section will, therefore, be given to the other evaluations.

(a) The Agrocon Ltd study recommendations led to a contract being given to Systems Ltd for further evaluating and developing improved organization and management (O&M) systems.

(b) The cropping systems review recommended, inter alia, an institutional strengthening component that supported the Agrocon Ltd recommendation, and, when both were accepted, the former by CARDI and the latter by USAID and CARDI, a contract was given to Systems Ltd for O&M systems and one to Price and Waterhouse for the financial systems both funded from the USAID project 538-0099.

(c) The evaluation of project 538-0015 led also to a Phase II funded by USAID in which the majority of the recommendations were incorporated.

(d) The technical assistance of the Phase II project 538-0099, provided through the South Eastern Consortium for International Development (SECID) inter alia a management consultant, a project (FSR) consultant, a financial consultant, and a consultant in personnel. The recommendations helped in refining the terms of reference of Systems Ltd but, more important, led to CARDI developing an internal capacity in a task force that worked with the consultants in making the systems developed more relevant to the Institute.

(e) The contract to Systems Ltd was the direct result of the Agrocon Ltd and cropping system recommendation.

(f) The Systems Ltd recommendations have already gone into the implementation phase. The Institute has started a programing, planning, monitoring and evaluation unit (PPE) and with the SECID consultants have begun training the PPE unit's three staff members as well as building into the Institute a strategic planning capability. The Institute has also adopted the project cycle and is well ahead in the program development system. The Institute now has a functioning accounting and financial system in place and is about to implement the recommended personnel system.

The development of a PPE unit is the culmination of efforts to develop an in-house capability in monitoring and evaluation. The project and programing system will also increase monitoring and reporting in the Institute, which will result in more effective evaluation. It should also be emphasized that these evaluations have been and will be utilized by politicians, members of CARDI staff management, program leaders, funding agencies, CARDI staff at various levels, members of the research advisory committee, and the various member governments.

Weaknesses

In the Agrocon Ltd study the time for evaluation was too short for the consultants to meet the various actors. The funds were insufficient to cover the needed

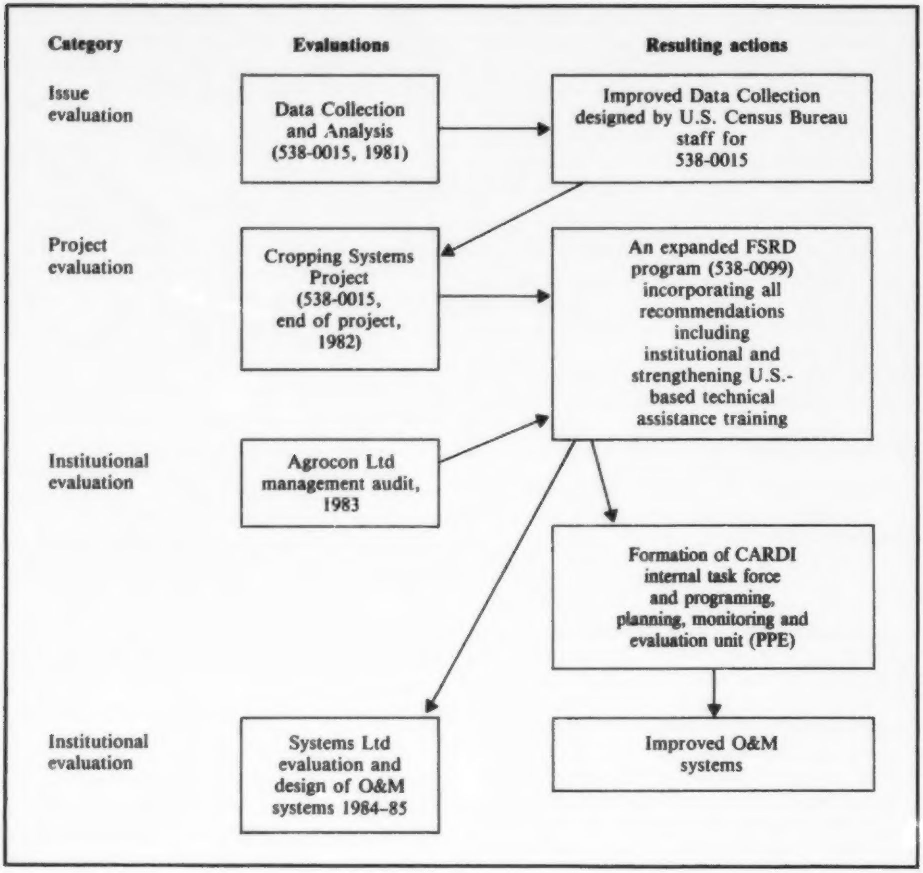
Category
Evaluations
Resulting actions
Issue evaluation
Data Collection and Analysis (538-0015, 1981)
Improved Data Collection designed by U.S. Census Bureau staff for 538-0015
Project evaluation
Cropping Systems Project (538-0015, end of project, 1982)
An expanded FSRD program (538-0099) incorporating all recommendations including institutional and strengthening U.S.-based technical assistance training
Institutional evaluation
Agrocon Ltd management audit, 1983
Formation of CARDI internal task force and programing, planning, monitoring and evaluation unit (PPE)
Institutional evaluation
Systems Ltd evaluation and design of O&M systems 1984–85
Improved O&M systems

Fig. 1. Links between various evaluations and implementations.

extensive travel and per diem, and the approach used, i.e., of a survey (question/answer interview) did not extract the needed information, particularly from the CARDI staff because of skepticism and a misunderstanding of the goals and objectives of the study. There was also an inability on the part of the consultants to overcome the reluctance of staff to engage in this study, which led to the general unacceptance. The overall scope was also too ambitious.

In the Institute-requested evaluation of data collection instruments and data processing in project 538-0015 (a) the consultants were generally unfamiliar with the target populations and their unique cultures; (b) the consultants were oriented more toward the classical census-type survey instead of a survey of biological systems and were, therefore, not the best suited personnel; and (c) although there was a genuine willingness to understand the culture and needs, the workshop and visits were inadequate mainly because the gap was too great. By the end of the review of project 538-0015 (a) the consultants were not familiar with the project elements on arrival; (b) did not have all available, relevant reports, data, and information; and (c) did not have a feel for the complex, small-scale farmer system in the Caribbean with which the Institute was working.

In the case of the Systems Ltd evaluation, weaknesses in the quality of the consultants and interpretation of the mandate and scope of work were minimized by attaching the internal CARDI task force to them. The task force and consultants from SECID augmented the experience of the consultants. In the case of the ISNAR study, the consultants tended to focus inadequately on programs — their content and direction, nature, and relevance, particularly to the larger territories and mechanisms for better relationships with national agricultural systems. It is too early to comment on the Sorhaindo Committee, which has just submitted its report, except that there are always difficulties when committees are set up with persons that still carry their full workloads and yet must report within fixed time limits.

In general, except for the Systems Ltd evaluation, most of the other evaluations were done through interviews without sufficient involvement of the Institute staff in planning the scope of work and implementation plan. In project 538-0015, an evaluation plan was built into the project; however, it was never adhered to, and the project lacked general reports at regular intervals to facilitate monitoring.

Strengths

In the Agrocon Ltd study, the consultants were from the Caribbean and understood the culture. They did interview staff. (In a way, however, these strengths were never used to advantage, on the contrary, they created several pitfalls.) In the data evaluation, the major strengths of the consultants were (a) that they were technically well trained, (b) they were committed to understanding the project and its needs, (c) they did recommend some excellent techniques for editing and monitoring of data, and (d) they followed up their recommendations with concrete, improved data-gathering instruments. For project 538-0015 (a) the consultants quickly grasped the key project elements through various exercises; (b) they had good training, although they were not experienced in the complex agriculture of the Caribbean; and (c) they made very constructive and valuable recommendations in respect to all phases of the work including the elements of a Phase II.

The formation of the CARDI task force and the experience and motivation of its members strengthened the Systems Ltd group. This was further augmented by the SECID management consultants. The greatest strength was that at every stage key actors from the Institute worked together with the consultant. By the time the report was submitted, the Institute felt it was theirs, and this made implementation very easy: (a) the ISNAR study started just as the Systems Ltd report was submitted and the task force was still at work and, therefore, the timing was right; (b) a reconnaisance was done to meet persons, develop strategies, agree on the scope of work, implementation, timing, etc.; and (c) there was adequate time for carrying out the study.

Generally, the greatest strength was in the involvement of Institute personnel at various levels, so that the exercise is not seen as policing, vindictive, or punitive. The use of a semipermanent task force ensures that there is continuity in communication and that the concerns of staff are reflected. Local consultants should also be involved when required.

Conclusion

CARDI has seen the benefits of evaluation but recognizes that setting up evaluation requires that a good monitoring and reporting system be in place. CARDI has set up a three-member team in a PPE unit that is assisted by SECID consultants and reports to the executive director. Such units must report to a high level, and the unit should not report to an outside board. CARDI is moving toward building evaluation processes into the lowest level of operations so that improvement becomes an ongoing process.

In concluding, a brief description follows of a very promising model of evaluation that exists within CARDI. In the IDRC-funded CARDI milk-production project in Guyana, there are annual workshops involving representatives from (a) the donor, (b) the host country, (c) CARDI, (d) project consultants, and (e) country cooperators. Their role is to evaluate and assess past work, develop projections, and decide on changes in foci, strategy, and directions. This generates formal reports with recommendations and action and has been found to be a most useful model. CARDI has been the centre of many various kinds of evaluations used at different levels. The Institution is rapidly developing its own capability for monitoring and evaluation. It has also developed an ongoing strategic planning process.

In making evaluations more effective, outside evaluators should work openly with Institute management. Teams should include country-Institute experts and tentative findings and conclusions should be shared with the Institute before publication to correct wrong impressions, decide on the best way to state negative findings, and make the recommendations more actionable. The purpose of evaluation should be improvement and, therefore, collaborative not confrontative. Institutes must also develop their own in-house capability to work with consultants and develop their own internal monitoring and evaluation unit.

Great care must be taken to ensure that evaluations with the same foci are not commissioned unless the findings of the previous ones are analyzed and action taken. CARDI, for example, had commissioned three major evaluations in the last 18 months with insufficient time for any to be studied carefully, resulting in duplication, overlap, disruption of the Institute's work and, of course, increased costs in time and money.

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